RS&H

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Ted Stevens Anchorage International Airport
Master Plan Update
Chapter 4 – Facility Requirements

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Preface

The Ted Stevens Anchorage International Airport (Airport) Master Plan Update (Master Plan Update) provides Airport management and the Alaska Department of Transportation & Public Facilities (DOT&PF) with a strategy to develop the Ted Stevens Anchorage International Airport. The intent of the Master Plan Update is to provide guidance that will enable Airport management to strategically position the Airport for the future by maximizing operational efficiency and business effectiveness, as well as by maximizing property availability for aeronautical development through efficient planning. While long-term development is considered in master planning efforts, the typical planning horizon for the Master Plan Update is 20 years.

The Federal Aviation Administration provides guidance for Master Plan development in FAA Advisory Circular 150 / 5070-6B, *Airport Master Plans*. Although not required, the Advisory Circular strongly recommends airports prepare a Master Plan. Funding for the Master Plan Update is provided primarily by the Federal Aviation Administration through an Airport Improvement Program grant.

A comprehensive Master Plan Update was last prepared between 2012 and 2014. This Master Plan Update was initiated in December 2021 and is anticipated to conclude in 2025. The DOT&PF entered into a contract with the firm RS&H to lead this effort. The Master Plan Update included a comprehensive public and stakeholder involvement program.

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Acronyms and Abbreviations

AAAC	Airport Airline Affairs Committee
AAC	Aircraft Approach Category or Alaska Administrative Code
AACC	Anchorage Airport Communications Committee
AAD	Annual Average Day
AADT	Annual Average Daily Traffic
AAGR	Average Annual Growth Rate
AC	Advisory Circular
ACHP	Advisory Council on Historic Preservation
ACMI	Aircraft, Crew, Maintenance, and Insurance
ACMP	Anchorage Coastal Management Plan
ACRP	Airport Cooperative Research Program
ADAPT	Annual Delay and Activity Performance Times
ADEC	Alaska Department of Environmental Conservation
ADF	Aircraft Deicing Fluid
ADF&G	Alaska Department of Fish and Game
ADG	Airplane Design Group
ADNR, OHA	Alaska Department of Natural Resources, Office of History and Archaeology
ADOLWD	Alaska Department of Labor and Workforce Development
AEDC	Alaska Economic Development Corporation
AFSC	Anchorage Fueling and Service Company
AGL	Above Ground Line
AHPA	Alaska Historic Preservation Act
AHRS	Alaska Heritage Resource Survey
AIAS	Alaska International Airport System
AIDEA	Alaska Industrial Development and Export Authority
AIP	Airport Improvement Program
Airport	Ted Stevens Anchorage International Airport
AIT	Advanced Imaging Technology
AMATS	Anchorage Metropolitan Area Transportation Study
ANGB	Air National Guard Base
AOA	Air Operations Area
APDES	Alaska Pollutant Discharge Elimination System
APU	Auxiliary Power Units
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Fire Fighting
AS	Alaska Statute
ASDA	Accelerate-Stop Distance Available
ASDE	Airport Surface Detection Equipment

ASIG	Aircraft Service International Group
ASPM	Aviation System Performance Metrics
ASR	Airport Surveillance Radar
ATCT	Airport Traffic Control Tower
AWMP	Anchorage Wetlands Management Plan
AWWU	Anchorage Water and Wastewater Utility
BAT	Best Available Technology
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
BRAC	Base Realignment and Closure
BRL	Building Restriction Line
CAA	Clean Air Act
CAD	Computer-aided Design
CATS	Compliance Activity Tracking System
CBIS	Checked Baggage Inspection System
CBP	Customs and Border Protection
CBRA	Checked Baggage Resolution Area
CCSF	Certified Cargo Screening Facility
CDS	Consolidated De-Icing Services
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generator
CFC	Customer Facility Charge
CFR	Code of Federal Regulations, or Crash / Fire / Rescue
CIP	Capital Improvement Plan
CO	Carbon Monoxide
Coastal Trail	Tony Knowles Coastal Trail
COD	Chemical Oxygen Demand
CONRAC	Consolidated Rental Car Facility
CUPPS	Common Use Passenger Processing Systems
CZMA	Coastal Zone Management Act
DHS	Department of Homeland Security
DME	Distance Measuring Equipment
DNL	Day-night Average Sound Level
DO	Dissolved Oxygen
DOT	U.S. Department of Transportation
DOT&PF	Alaska Department of Transportation and Public Facilities
EAS	Essential Air Service
EDS	Explosive Detection System

EMS	Environmental Management System
EOC	Emergency Operations Center
EQA	Equivalent Aircraft
ETD	Explosive Trace Detection
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FBO	Fixed Base Operator
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
FIS	Federal Inspection Service
FMRA	FAA Modernization and Reform Act of 2012
FY	Fiscal Year
GA	General Aviation
GPS	Global Positioning System
GRE	Ground Run-Up Enclosure
GSE	Ground Service Equipment
HLB	Heritage Land Bank
IAS	International Aviation Services, Inc.
IATA	International Air Transport Association
IBC	International Building Code
IFR	Instrument Flight Rules
IFT	International Freight Terminal
ILS	Instrument Landing System
INM	Integrated Noise Model
ISER	Institute of Social and Economic Research (at the University of Alaska Anchorage)
JBER	Joint Base Elmendorf-Richardson
LDA	Landing Distance Available
LOC	Localizer
LOS	Level of Service
LUST	Leaking Underground Storage Tank
MOA	Municipality of Anchorage
MSA	Metropolitan Statistical Area
MSGP	Multi-Sector General Permit
MSL	Mean Sea Level
MTOW	Maximum Takeoff Weight
NAAQS	National Ambient Air Quality Standards
NAC	Northern Air Cargo
NADP	Noise Abatement Departure Profiles

NAMS	Northern Air Maintenance Services
NAVAID	Navigational Aid
NCP	Noise Compatibility Program
NDB	Non-directional Beacon
NEMs	Noise Exposure Maps
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPIAS	National Plan of Integrated Airport System
NPL	National Priorities List
NRHP	National Register of Historic Places
O&D	Origin and Destination
O&M	Operations and Maintenance
OAIASS	Optimize AIAS Strategy
OER	Operating Expense Ratio
OFA	Object Free Area
OFZ	Obstacle Free Zone
OSR	On-Screen Resolution
PAL	Planning Activity Level
PAPI	Precision Approach Path Indicator
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PDARS	Performance Data Analysis and Reporting System
PFAS	Per- and Polyfluoroalkyl Substances
PFC	Passenger Facility Charges
PM-10	Particulate Matter with a Diameter of 10 Microns or Less
PM-2.5	Particulate Matter with a Diameter of 2.5 Microns or Less
QTF	Quick-Turnaround Facility
RCRA	Resource Conservation and Recovery Act
RDC	Runway Design Code
RNAV	Area Navigation
ROFA	Runway Object Free Area
RON	Remain Overnight
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RSIP	Residential Sound Insulation Program
RTR	Remote Transmitter Receiver
SCS	Sterile Corridor System

SHPO	State Historic Preservation Office(r)
SIDA	Security Identification Display Area
SIP	State Implementation Plan
SSCP	Security Screening Checkpoint
STEP	South Terminal Expansion Project
SWPPP	Stormwater Pollution Prevention Plan
TACAN	Tactical Air Navigation
TDG	Taxiway Design Group
TERPS	Terminal Instrument Procedures
TODA	Takeoff Distance Available
TORA	Takeoff Run Available
TRACON	Terminal Radar Approach Control
TSA	Transportation Security Administration
UPS	United Parcel Service
USDA-WS	U.S. Department of Agriculture - Wildlife Services
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USPS	United States Postal Service
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VOCs	Volatile Organic Compounds
VOR	Very High Frequency Omnidirectional Range
WAAS	Wide Area Augmentation Systems
WADP	West Anchorage District Plan
WBI	Whole Body Imaging
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan

4.1 Introduction

Future airport facility requirements include the size, type, and quantity of facilities necessary to accommodate the forecast needs of the Ted Stevens Anchorage International Airport (ANC).

The ANC facility requirements are organized and described based on the following functional areas:

- Airfield
- Terminal
- Landside
- Air Cargo
- General Aviation
- Support Facilities

Requirements for new or improved facilities can be driven by several variables. For example, facility improvements can be required to meet standards and requirements from regulatory agencies (e.g., Federal Aviation Administration [FAA]), changing economic environment, and/or accommodating new / evolving airport services.

Facility requirements can also be driven by the need for facilities to accommodate forecast demand. The forecast demand metrics that may trigger the need for additional facilities include aircraft operations, passenger enplanements, and air cargo volume.

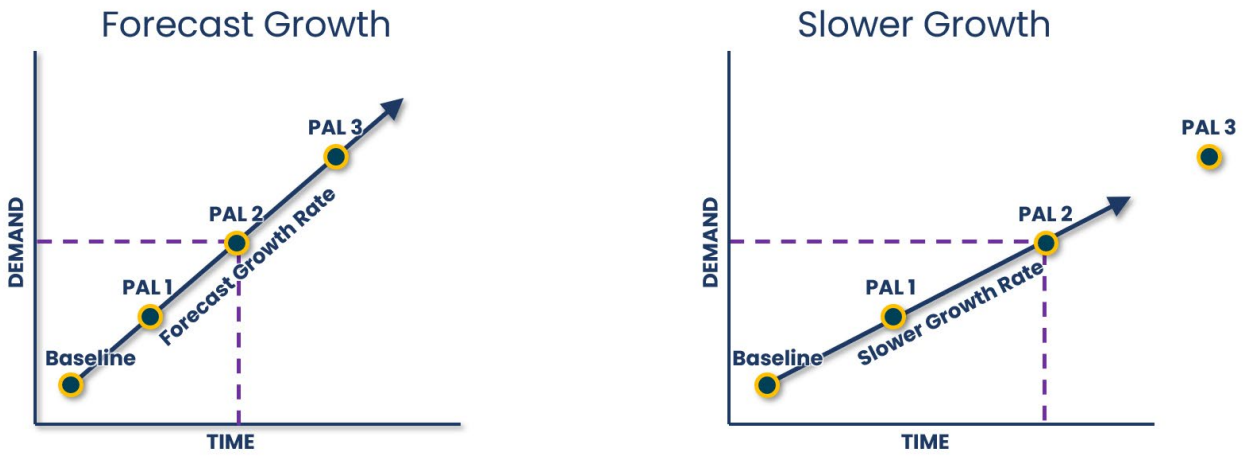
4.2 Planning Activity Levels

Planning Activity Levels (PALs) are used for the purposes of the facility requirements analysis phase of the Master Plan instead of forecast years. Each PAL represents the demand level associated with a particular forecast year. Thus, PALs also represent the demand threshold at which facility improvements are required.

Attributing the facility requirements to a PAL milestone (rather than a year) allows the facility improvement to be demand-driven, rather than calendar-driven. This approach allows the Airport to better track and implement facility improvements based on the corresponding aviation demand even if aviation activity grows faster or slower than forecast. This allows for phased facility improvements to align with demonstrated demand, so the Airport does not over- or under-develop facilities. This culminates in a demand-driven, phased approach for airport development.

An example of how PALs help accommodate changes in forecast growth with facility requirements is depicted in **Figure 4-1**. Specific facility improvements are needed to accommodate the PAL 2 demand in this example scenario. The facility improvement may be required at a specific calendar year based on the forecast growth. However, the facility improvement will be implemented later based on the PAL 2 demand occurs if aviation demand grows slower than forecast. The facility improvement is tied to demonstrated aviation activity demand at the Airport, not based on a specific time.

Figure 4-1
Planning Activity Levels (PALs)



Source: RS&H, 2024.

The forecast demand metrics for the 20-year planning period are described in **Chapter 3, Forecast of Aviation Demand**. The Base PAL represents the 2022 forecast year, PAL 1

represents the 2027 forecast year, PAL 2 represents the 2032 forecast year, and PAL 3 represents the 2042 forecast year.

Demand-based facility requirements analysis is typically prepared either based on annualized forecast demand or peak period demand. The peak period can be seasonally, monthly, daily, hourly, or sometimes partial-hourly. Preparing a design day flight schedule is key to understanding the daily, hourly, and partial-hourly demand profile.

A design day flight schedule was prepared for each of the PAL. The average day of the peak month in the base year was used as the basis to prepare the design day flight schedules. The peak month at ANC is traditionally a summer month. The peak month in 2022 was June. Thursday, June 23rd, 2022, is the average day of the peak month which was selected to be the design day.

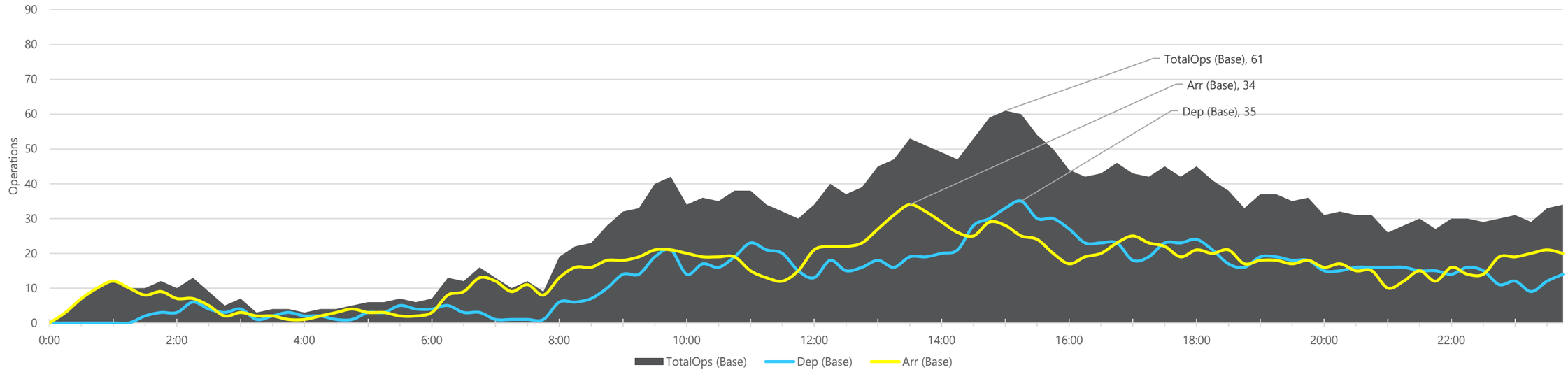
The commercial passenger and cargo flight schedules on June 23rd, 2022, were used to populate the design day flight schedule. A different approach was taken to represent general aviation operations in the design day flight schedule. Average general aviation operations per hour over the 2022 calendar year was used to establish the distribution of general aviation flights across the design day. That proportional distribution was applied to the total general aviation operations for the average day peak month of the base year to establish the design day general aviation operations count.

The Base PAL design day flight schedule is extrapolated to represent future PAL by proportionally growing the distribution of flights throughout the design day. The operation counts throughout the design day for each PAL are depicted in **Figure 4-2**, **Figure 4-3**, **Figure 4-4**, and **Figure 4-5**. The passenger counts throughout the design day for each PAL are depicted in **Figure 4-6**, **Figure 4-7**, **Figure 4-8**, and **Figure 4-9**.

The aircraft operations PAL values are summarized in **Table 4-1**. The air cargo volume PAL values are summarized in **Table 4-2**. The passenger PAL values are summarized in **Table 4-3**.

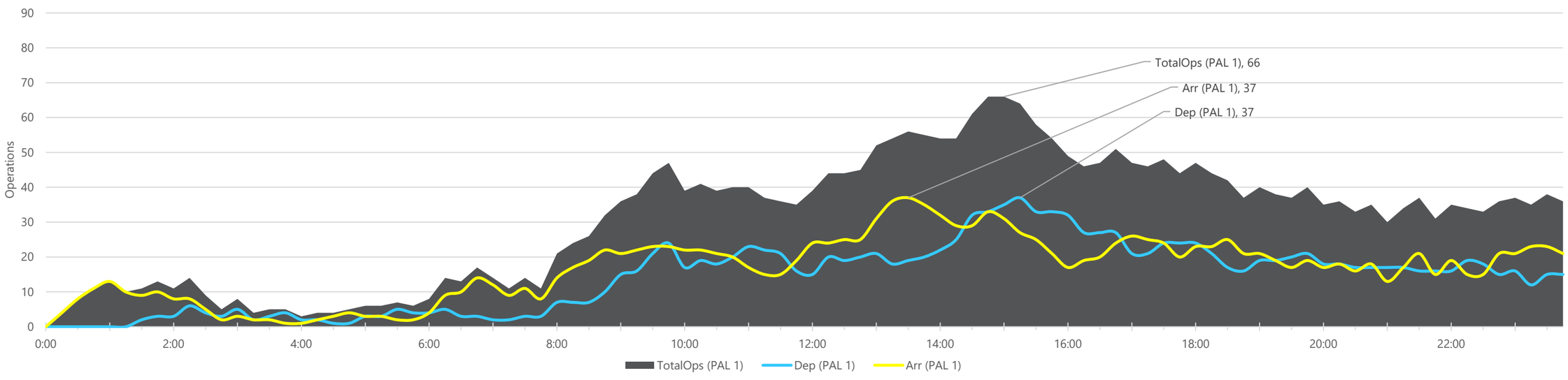
Rolling peak period passenger counts were calculated in consideration of early arrival behavior for originating passengers. The early arrival behavior which is based on the distribution of passenger arrival at airport prior to scheduled flight departure is described in **Table 4-4**.

Figure 4-2
Design Day Operation Counts – Base PAL (Rolling Hour)



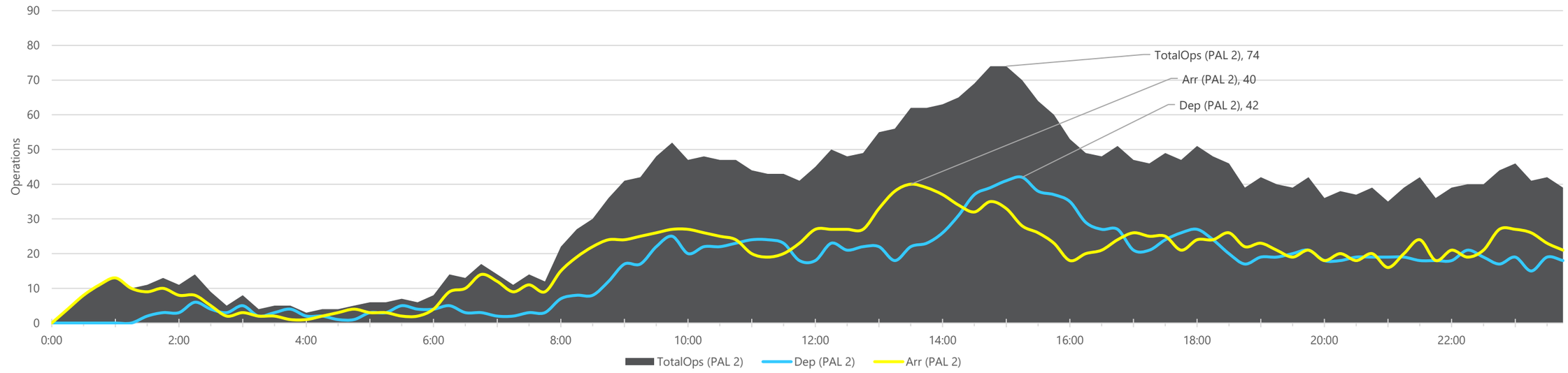
Source: RS&H Analysis, 2024.

Figure 4-3
Design Day Operation Counts – PAL 1 (Rolling Hour)



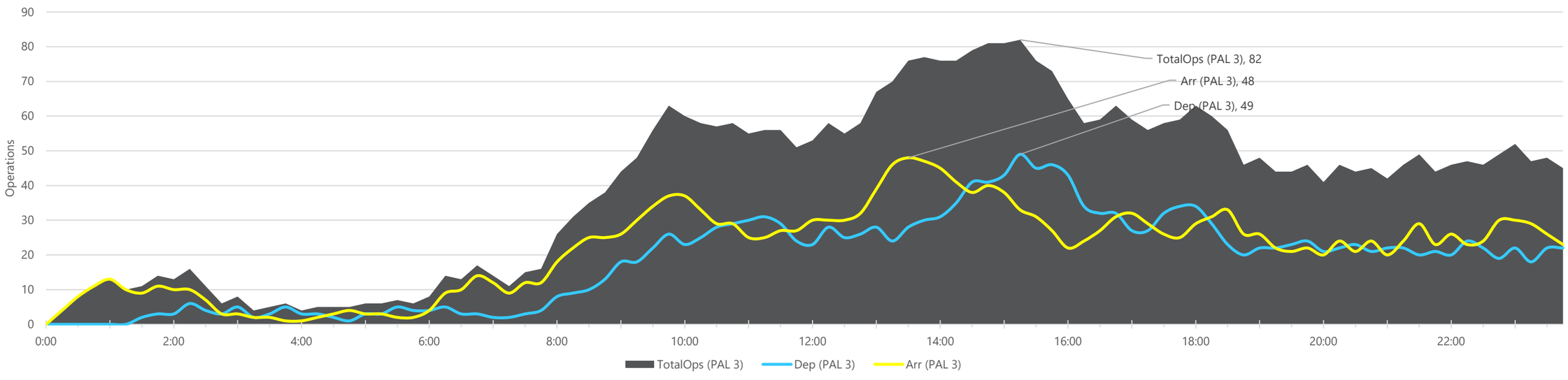
Source: RS&H Analysis, 2024.

Figure 4-4
Design Day Operation Counts – PAL 2 (Rolling Hour)



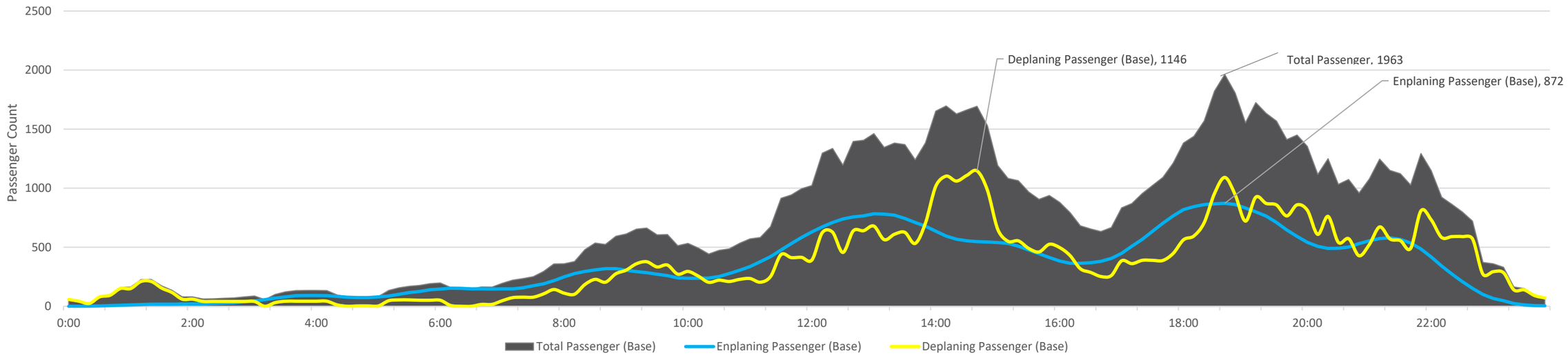
Source: RS&H Analysis, 2024.

Figure 4-5
Design Day Operation Counts – PAL 3 (Rolling Hour)



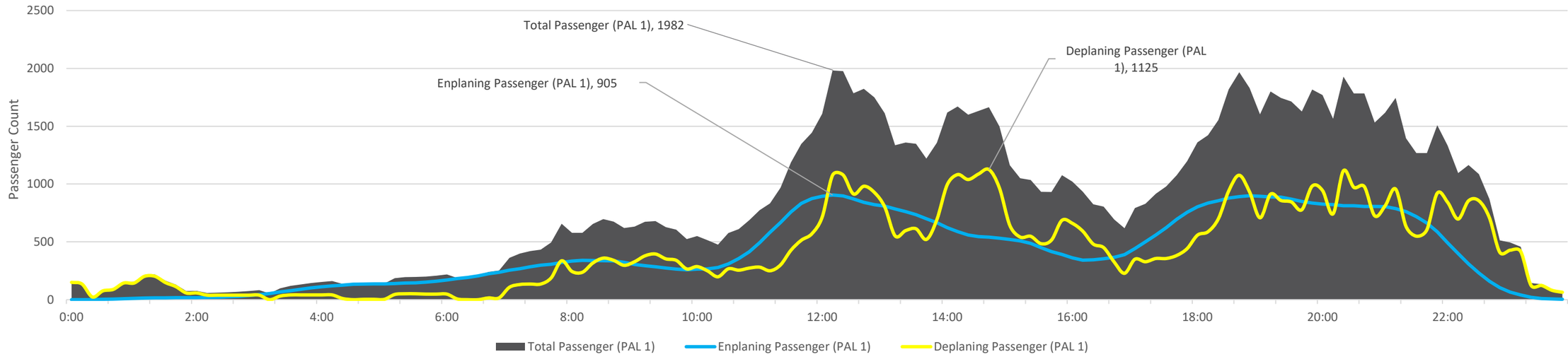
Source: RS&H Analysis, 2024.

Figure 4-6
Design Day Passenger Counts – Base PAL (Rolling Hour)



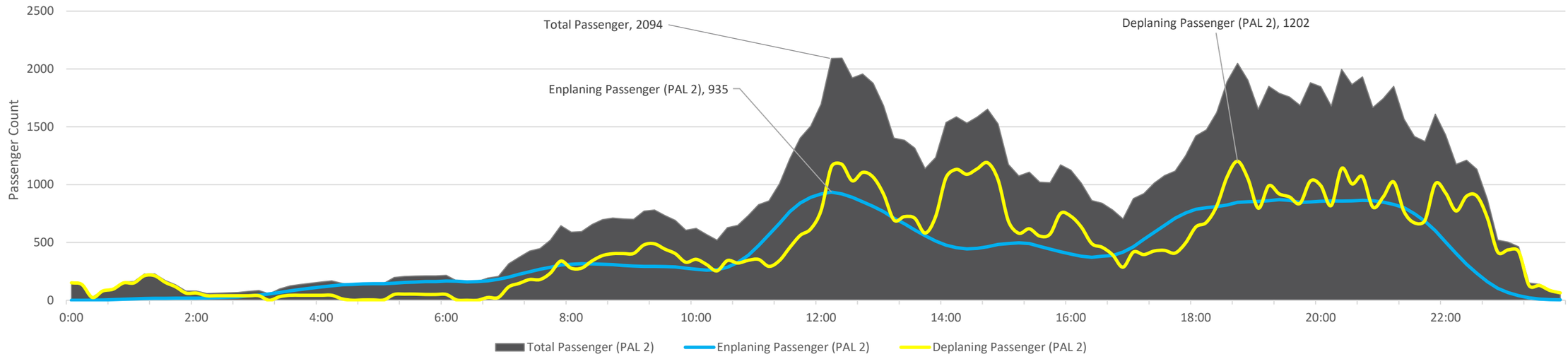
Source: RS&H Analysis, 2024.

Figure 4-7
Design Day Passenger Counts – PAL 1 (Rolling Hour)



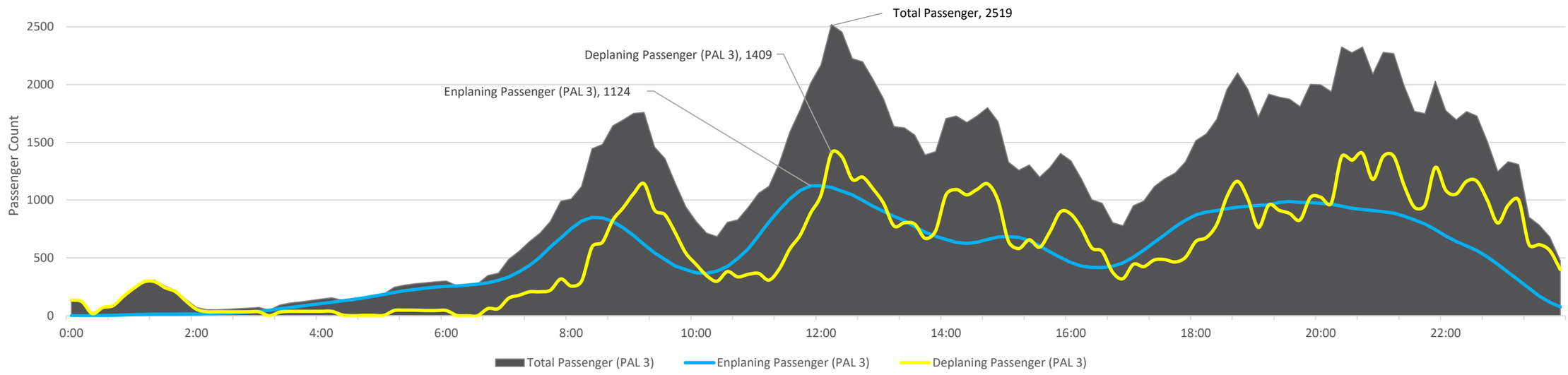
Source: RS&H Analysis, 2024.

Figure 4-8
Design Day Passenger Counts – PAL 2 (Rolling Hour)



Source: RS&H Analysis, 2024.

Figure 4-9
Design Day Passenger Counts – PAL 3 (Rolling Hour)



Source: RS&H Analysis, 2024.

Table 4-1
Planning Activity Level Forecast Summary – Operations

Planning Activity Level	Demand			
Corresponding Forecast Year	Base 2022	PAL 1 2027	PAL 2 2032	PAL 3 2042
Annual				
Total Aircraft Operations	226,346	251,260	276,414	325,775
Passenger Operations	81,448	90,646	102,085	122,959
Air Cargo Operations	112,202	125,833	138,385	163,794
General Aviation Operations	29,009	31,181	32,344	35,422
Military Operations	3,687	3,600	3,600	3,600
Design Day				
Total Aircraft Operations	744	824	904	1,058
Peak Hour				
Total Aircraft Operations	61	66	74	82
Aircraft Departures	35	37	42	49
Aircraft Arrivals	34	37	40	48

Source: RS&H Analysis, 2024

Table 4-2
Planning Activity Level Forecast Summary – Air Cargo Volume

Planning Activity Level	Demand			
Corresponding Forecast Year	Base 2022	PAL 1 2027	PAL 2 2032	PAL 3 2042
Annual				
Total Air Cargo Volume (Ton)	3,588,628	4,219,217	4,877,193	6,184,227
Enplaned Air Cargo Volume (Tons)	983,565	980,968	1,133,948	1,422,372
Deplaned Air Cargo Volume (Tons)	979,638	1,044,256	1,207,105	1,546,057
In-Transit Air Cargo Volume (Tons)	1,625,425	2,193,993	2,536,140	3,215,798

Source: RS&H Analysis, 2024

Table 4-3
Planning Activity Level Forecast Summary – Passengers

Planning Activity Level Corresponding Forecast Year	Demand Base 2022	 PAL 1 2027	 PAL 2 2032	 PAL 3 2042
Annual				
Passenger Enplanements	2,564,262	3,025,294	3,367,638	4,056,254
Design Day				
Passenger Enplanements	8,697	10,212	11,291	13,907
Peak Hour				
Total Passenger Count	1,963	1,982	2,094	2,519
Enplaning Passengers	872	905	935	1,124
Deplaning Passengers	1,146	1,125	1,202	1,409
Originating Passengers	682	707	725	871
Terminating Passengers	896	879	932	1,092
Peak 30-Min				
Total Passenger Count	1,087	1,110	1,170	1,363
Enplaning Passengers	442	467	478	579
Deplaning Passengers	817	802	852	917
Originating Passengers	346	365	371	449
Terminating Passengers	639	627	660	711
Peak 20-Min				
Total Passenger Count	799	863	911	1,017
Enplaning Passengers	299	324	326	388
Deplaning Passengers	616	603	642	718
Originating Passengers	234	253	253	301
Terminating Passengers	482	471	498	557

Source: RS&H Analysis, 2024

Table 4-4
Distribution of Passenger Arrival at Airport Prior to Scheduled Flight Departure

Time Prior to Departure	Percent of Passengers Arriving at Terminal
More than 120 minutes	15%
90-120 Minutes	48%
60 to 90 Minutes	25%
30-60 Minutes	11%
Less than 30 Minutes	1%

Source: RS&H Analysis, 2024

4.3 Critical Aircraft

The fleet mix for ANC is described in **Table 4-5**. This does not represent a comprehensive list of aircraft that operate at ANC. Rather it is representative of the most common aircraft types that operate at ANC and thus are considered for facility planning.

The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar elements, which make regular use of the airport. Regular use is 500 annual operations. Critical aircraft are a key determinant of airport planning and design. Different aircraft may define separate elements of the airport design; therefore, effective airport planning may need to consider different and multiple critical aircraft. It sets the dimensional requirements of an airport, such as the separation distance between taxiways and runways and the size of certain areas protecting the safety of aircraft operations and passengers. An accurate determination of critical aircraft matches aircraft operational area dimensions to the most demanding aircraft that regularly use the runways and taxiways.

The critical aircraft for ANC moving forward into PAL 3 is the Boeing 747-8F (B748F). The Boeing 747-8F meets FAA requirement for 500 or more annual operations. An airport accommodating the Boeing 747-8F must balance its infrastructure while efficiently managing a diverse fleet of smaller aircraft. The airport must ensure seamless integration with smaller aircraft operations, avoiding congestion and delays.

Table 4-5
ANC Aircraft Fleet Mix Summary

Aircraft Type	Demand			
	Base	PAL 1	PAL 2	PAL 3
Annual				
Passenger Operations				
A321	1,770	2,370	2,388	3,634
A332	0	0	1,194	1,211
A333	590	592	1,194	1,211
AT4	0	0	19,701	23,017
AT7	0	0	6,567	8,480
B38M	1,180	1,185	6,567	13,931
B39M	10,030	11,848	30,447	41,793
B737	5,900	6,516	0	0
B738	12,390	13,625	4,776	0
B739	12,390	14,218	2,985	0
B763	1,180	1,777	0	0
DH3	2,360	2,370	0	0
DH8C	18,290	19,549	0	0
E75	3,540	4,739	12,537	15,748
Other Turboprop	11,828	11,857	13,729	13,933
Air Cargo Operations				
B737	9,240	8,580	5,280	5,280
B738	2,640	5,280	11,880	13,200
B744	25,740	29,700	31,020	17,160
B748F	13,200	14,520	17,160	45,540
B763	3,300	3,300	3,300	0
B777F	23,760	27,720	38,940	48,180
C130	1,320	1,320	1,320	1,320
C208	3,960	8,580	9,240	11,880
E120	17,160	17,820	19,140	20,460
MD11	5,940	5,940	0	0
MD82	1,980	1,980	0	0
MD83	660	660	0	0
Other Turboprop	3,302	433	1,105	774
General Aviation Operations				
C172	9,492	10,164	10,396	11,350
C402	14,464	15,246	15,820	16,798
Other Turboprop	5,053	5,771	6,128	7,274
Military Operations				
Other	3,687	3,600	3,600	3,600

Source: RS&H Analysis, 2024

4.4 Airfield

Airfield facility requirements include four elements: airfield demand/capacity, runway requirements, taxiways/taxilanes requirements, and navigational aids (NAVAIDs). This section describes the analysis methodology and results used to determine the requirements for these airfield elements.

4.4.1 Demand / Capacity Analysis

Airfield capacity is defined as the number of aircraft operations (i.e., takeoffs and landings) that can be accommodated on the airfield while achieving a desired level of operational efficiency. The level of operational efficiency is described by calculating the amount of delay that each aircraft operation experiences during a specific period of time. The metrics used to describe airfield delay include average annual delay, average delay, and peak hour delay. The airfield demand/capacity analysis evaluates how the forecast operations for each PAL are accommodated on the airfield, as measured by the level of delay.

This section includes a summary of the airfield demand/capacity analysis completed as part as the Airport Master Plan Update. A description of the analysis methodology, inputs, and results are included in this section. A detailed description of the analysis inputs is included in **Appendix D – Airfield Capacity Assessment**.

Airfield demand / capacity analysis was completed as part of the 2013 Alaska International Airport System (AIAS) Planning Study (AIAS Planning Study) and the 2014 ANC Airport Master Plan Update. The results of the analysis completed as part of the 2014 ANC Airport Plan Update was used to identify the Preferred Alternative to construct a new runway at ANC as one solution to accommodate forecast demand if and when the operational demand warrants infrastructure changes. The results of the previous airfield demand/capacity analyses are still considered to be valid and are not revisited in this Airport Master Plan. The purpose of the demand/capacity analysis in this Airport Master Plan is to evaluate options to optimize the ANC airfield with its existing three runways so the focus is on taxiways and aircraft parking locations. The airfield demand/capacity analysis for this ANC Airport Master Plan is used to establish a baseline for comparing the demand/capacity analysis results associated with potential airfield concepts explored in **Chapter 5 Airport Alternatives**.

AirTOP airfield simulation was used to calculate the airfield demand/capacity using a simulation model prepared for the ANC airfield. The AirTOP software was used to simulate design day operations at ANC using parameters specific to the operation at ANC, which included:

- Forecast fleet mix and frequency of operations included in the design day flight schedule for each PAL
- Runway assignment

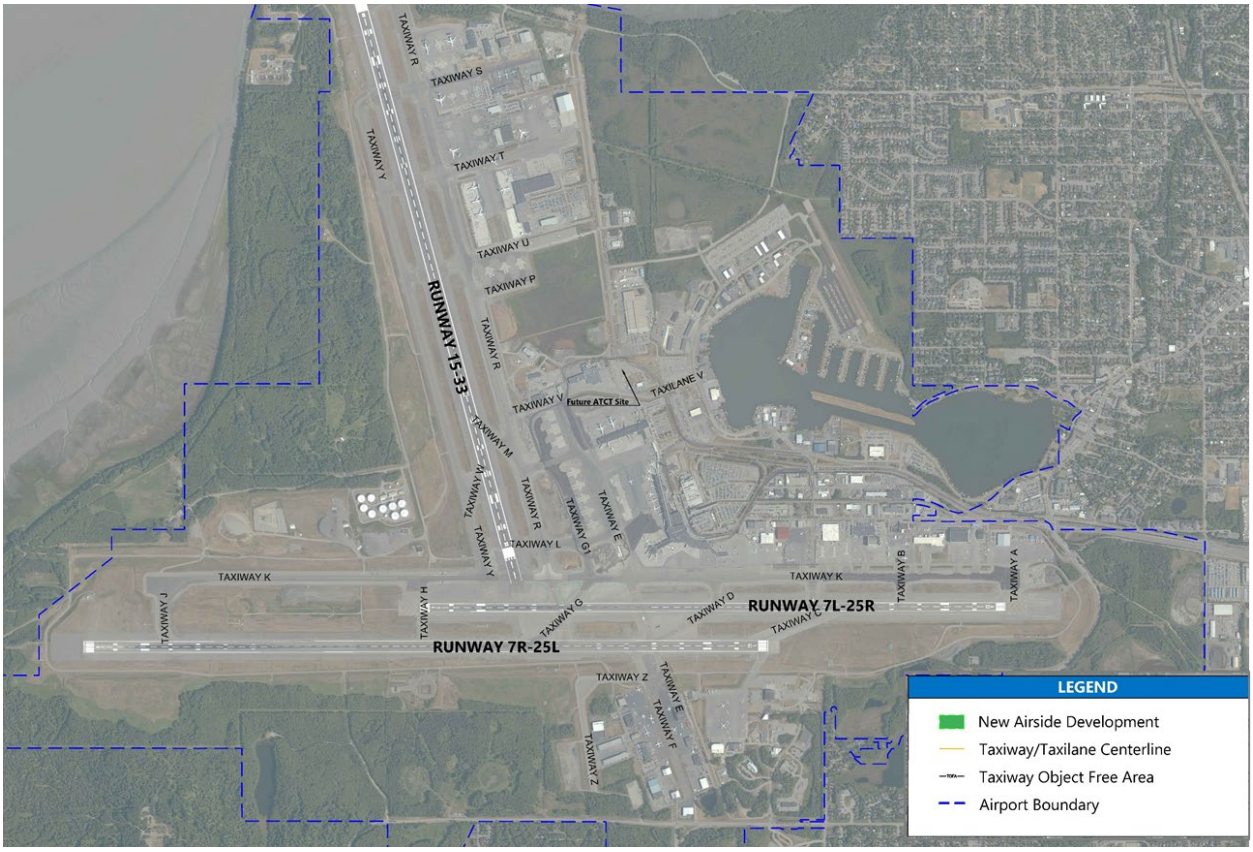
- Runway use configurations
- Typical arrival and departure procedures
- Departing aircraft in-trail separation
- Arriving aircraft in-trail separation
- Runway dependencies
- Runway exit splits for arriving aircraft
- Typical aircraft taxiing procedures and taxiway operational restrictions based on aircraft size
- Aircraft allowed to hold between Runway 7L-25R and Runway 7R-25L.
- Aircraft parking position allocated based on aircraft type and airline

The AirTOP model was calibrated based on results reported from the previous airfield modelling demand/capacity analyses. The AirTOP model for existing airfield layout was validated through coordination with ATC staff. The AirTOP model for Baseline Airfield Layout was prepared following the calibration and validation process for the existing airfield. The Baseline Airfield Layout included development projects that were identified and planned for implementation at the time the demand capacity analysis was initiated (early 2023). This includes the phased extension of Taxiway Z and the implementation of a large air cargo development in South Airpark. The Baseline Airfield Layouts are depicted in **Figure 4-10**, **Figure 4-11**, and **Figure 4-12**. The Baseline Airfield Layout assumed that the existing airfield procedures described in the Anchorage Air Traffic Control Tower Standard Operations Procedures published February 15, 2023, would largely remain. The airfield demand/capacity analysis was performed for the Baseline Airfield Layout for each PAL.

A Preferential Runway Use Program is in use at ANC to minimize noise impacts to the community around the Airport. The Preferential Runway Use Program identifies preferred flow of traffic for most operations to occur over the Cook Inlet, rather than over the populated land areas. The preferred flow is for arriving aircraft to approach from the west and the north and departing aircraft to leave to the north and west. ATC uses different runway configurations based on local weather.

The five runway use configurations and the proportion of time ANC operates in each runway use configuration is depicted in **Figure 4-13**. The proportion of time the airfield operates in each configuration was determined using National Oceanic and Atmospheric Administration (NOAA) hourly meteorological data that was observed from 2010-2022 by the Automated Surface Observing Systems (ASOS) equipment located at ANC. The identification of the runway use configuration was based on the analysis of the hourly meteorological observations and the triggering conditions described in ANC ATCT Standard Operating Procedures.

Figure 4-10
Baseline Airfield Layout – Base PAL

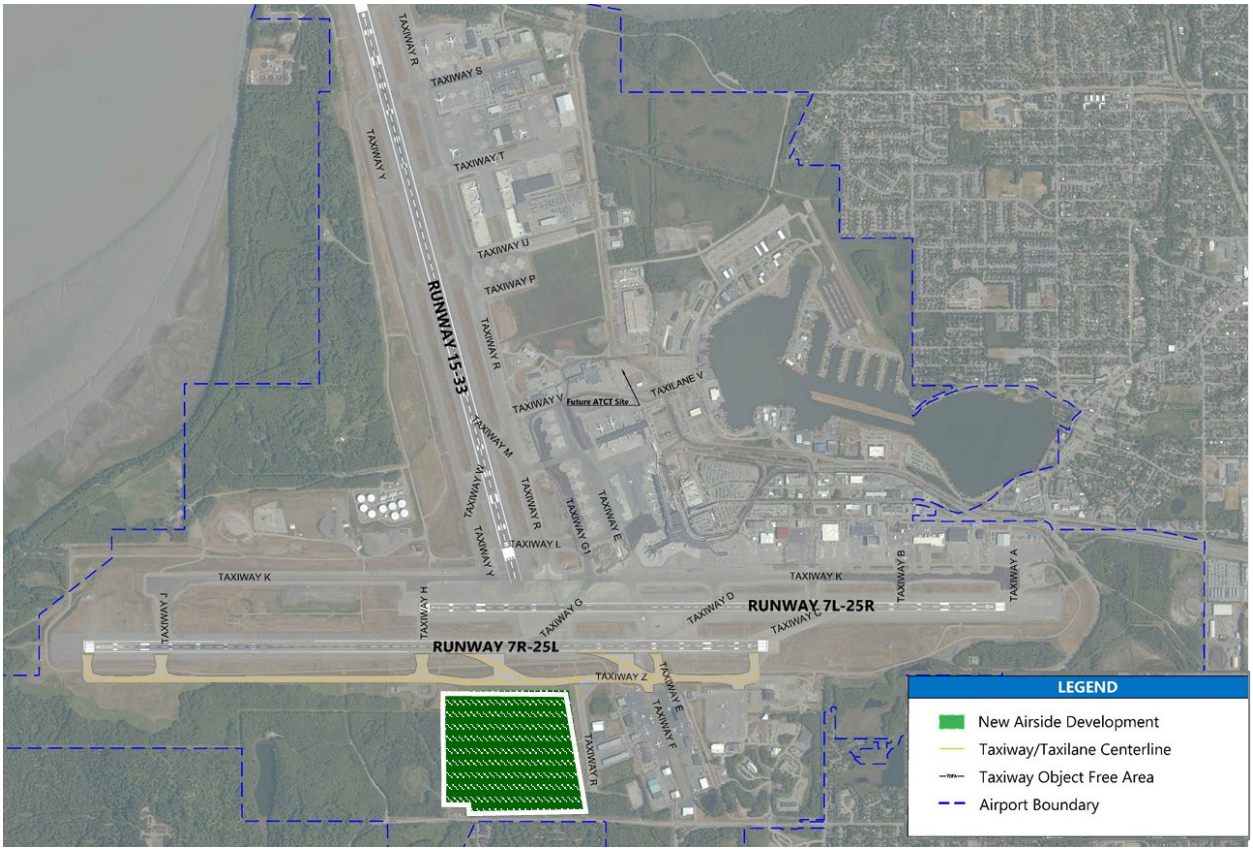


Source: RS&H Analysis, 2024

This airfield demand/capacity analysis did not evaluate the demand/capacity of the aircraft parking positions. The apron requirements for the passenger terminal are described in **Section 4.5.1**. The aircraft parking position requirements for air cargo are described in **Section 4.7.2**. The aircraft parking position requirements for general aviation are described in **Section 4.8.2**.

Airline surveys issued during the 2013 Alaska International Airport System (AIAS) Planning Study indicated that "untenable delay" occurs when flights are delayed 30 minutes or more during the peak hour more than 10% of the time. This delay threshold is generally related to the amount of delay air carriers can tolerate to their scheduled operations and still operate efficiently. The air carriers that are particularly sensitive to delays in and out of ANC are integrated air cargo operators which need to reach cargo hubs in time for cargo sort times in the Lower 48. These airlines tend to have less flexibility to adjust flight schedules to compensate for delays. Limited operational delay that occurs infrequently is acceptable and airlines operate with some degree of flexibility to accommodate these limited delays. Airline representatives agreed that the previously established untenable delay threshold remained a viable metric when asked during Airline Advisory Committee meetings as part of this Master Plan Update.

Figure 4-11
Baseline Airfield Layout – PAL 1 and PAL 2



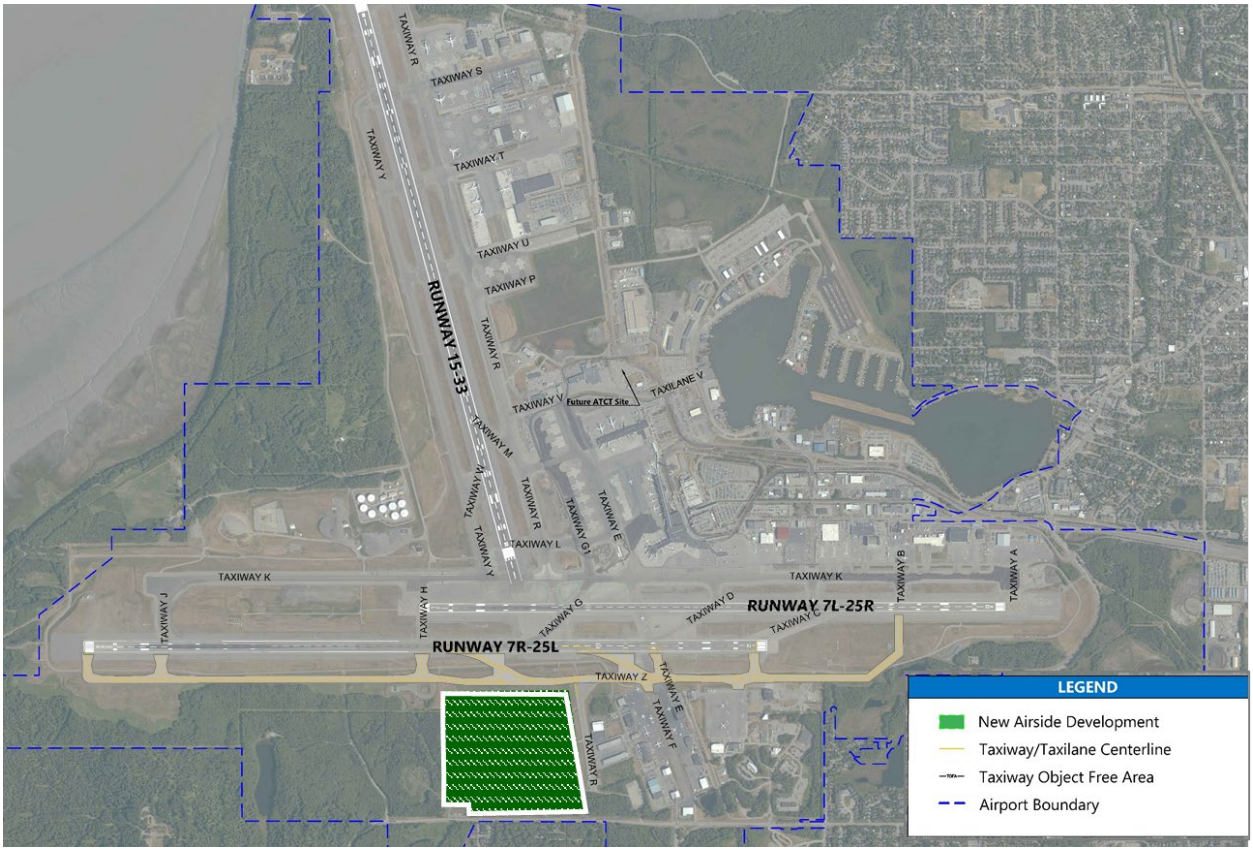
Source: RS&H Analysis, 2024

The takeaways from the Baseline airfield demand/capacity analysis are that the airfield is expected to operate efficiently through PAL 2. The threshold for untenable delay is not reached until PAL 3. At PAL 3, the peak hour delay exceeds 30 minutes in Configuration 1 Visual Meteorological Conditions (VMC) and Configuration 1 Instrument Meteorological Conditions (IMC) which results in untenable delay. The peak hour delay also exceeds the 30-minute delay threshold in Configuration 2 IMC, and Configuration 3 VMC; however, the runway use configurations occur less than 10% of the time so the delay is not considered to be untenable since the frequency does not meet the threshold.

The Baseline airfield demand/capacity analysis results are described in **Table 4-6**. The untenable delay associated with Configuration 1 occurs because of the head-to-head taxi operations that occur near the central portion of the airfield. Analysis shows that 38% of aircraft landing on Runway 7L exit at Taxiway D to the north and 74% of aircraft arriving on Runway 7R exit on Taxiway G to the north. These arriving aircraft taxi north on Taxiway R, Taxilane G1, or Taxilane E to their parking positions. The stream of arriving aircraft exiting and taxiing north in the central part of the airport can cause congestion during peak arrival operations. However, the untenable

delay results when the arrival taxi operations mix with departure taxi operations in the same central area of the airfield.

Figure 4-12
Baseline Airfield Layout – PAL 3



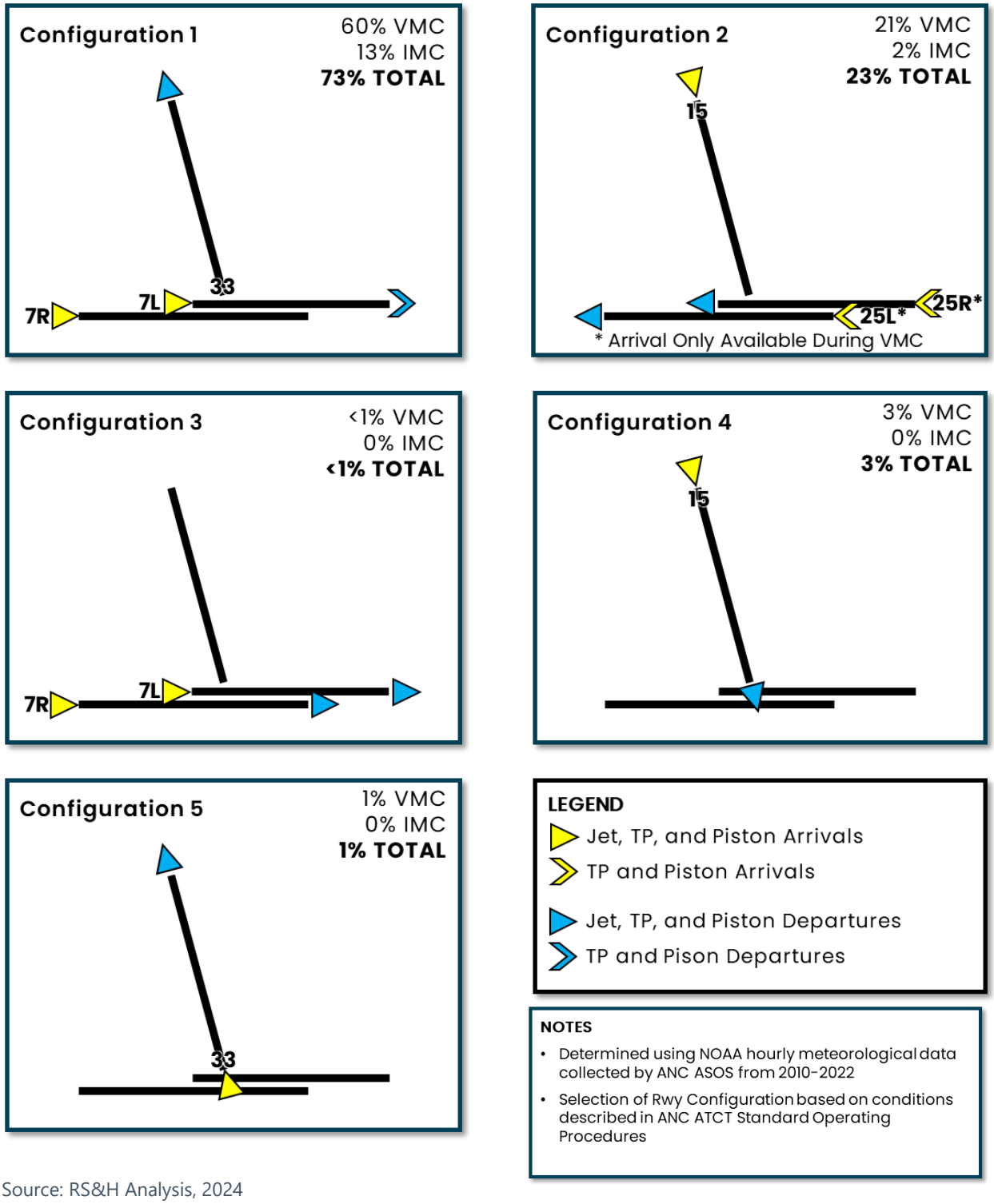
Source: RS&H Analysis, 2024

Most aircraft departing Runway 33 queue on Taxiway R or Taxiway K for departure. Aircraft queued for departure can create chokepoints for arriving traffic which requires Taxilane G1 and Taxilane E to be used as a bypass route for arriving aircraft. This is especially the case as the departure queue on Taxiway R extends north beyond the intersection with Taxiway M. This is important because that is the northernmost point of the Taxiway where arriving aircraft can rejoin Taxiway R from Taxilane G1 or Taxilane E to taxi to parking positions in the North Airpark. Coordination with ATC and observations of the airfield from the ATCT indicate that controllers try to avoid this chokepoint when it occasionally occurs in existing conditions by routing departing aircraft from the North Airpark to Taxiway Y via Taxiway S, Taxiway T, and Taxiway U. This shifts some of the aircraft queued for departure on Runway 33 to Taxiway Y from Taxiway R. This keeps the Taxiway R queue short enough so arriving aircraft can rejoin Taxiway R at Taxiway M to continue taxiing north to parking positions in the North Airpark. This operation works with

the existing air traffic levels; however, airfield modelling shows that this operation would result in excessive congestion when operations reach PAL 3. This is due in part because aircraft leaving the North Airpark for departure on Runway 33 can use southbound Taxiway Y only if they cross Runway 15-33. The runway crossing requires pausing departure operations to create a gap in departure flow which reduces airfield efficiency and slows the dissipation of the departure queue.

The analysis indicates that the congestion may be reduced if there were two parallel taxiways east of Runway 15-33 so that aircraft could taxi north and south at the same time without a runway crossing. Another consideration is reducing the concentration of aircraft parking along the Taxiway R corridor area between the passenger terminal, cargo parking areas, and North Airpark. Potential concepts to resolve the airfield congestion are described in **Chapter 5 Airport Alternatives**.

Figure 4-13
Runway Use Configurations



Source: RS&H Analysis, 2024

Table 4-6
Baseline Airfield Demand/Capacity Results

Operations Demand			Configuration	Weather	Utilization	Operations Throughput		Average Peak Hour Delay (minutes of delay per aircraft during peak hour)			Average Daily Delay (minutes of delay per aircraft during average day)			Average Annual Delay (annualized minutes of delay per aircraft)
Annual	Design Day	Rolling Peak Hr				Departure	Arrival	Departure	Arrival	Peak Total	Departure	Arrival	Peak Total	
Base PAL														
226,346	744	61	1	VMC	60%	27	36	3.5	1.7	4.7	0.7	0.3	1.0	**1.3**
			1	IMC	13%	24	35	3.4	2.1	5.5	0.7	0.3	1.1	
			2	VMC	21%	24	30	2.2	3.7	5.4	0.3	0.3	0.6	
			2	IMC	2%	35	24	2.1	4.5	6.6	0.3	0.7	1.0	
			3	VMC	1%	34	36	15.6	2.0	16.7	1.9	0.4	2.3	
			Weighted Delay (min)					**5.7**	**2.4**	**7.6**	**1.0**	**0.3**	**1.3**	
PAL 1														
251,260	824	66	1	VMC	60%	33	35	3.3	10.0	10.7	0.5	1.8	2.3	**2.0**
			1	IMC	13%	36	36	12.9	12.5	25.4	0.9	1.9	2.8	
			2	VMC	21%	31	34	4.1	4.0	6.6	0.5	0.7	1.2	
			2	IMC	2%	33	35	2.6	8.2	9.2	0.3	0.8	1.2	
			3	VMC	1%	43	36	9.8	1.9	11.7	0.6	0.3	1.0	
			Weighted Delay (min)					**4.6**	**8.7**	**11.3**	**0.5**	**1.5**	**2.0**	
PAL 2														
276,414	904	74	1	VMC	60%	35	43	12.7	7.0	18.8	0.8	1.0	1.8	**1.5**
			1	IMC	13%	37	42	10.1	19.1	20.6	0.2	1.3	1.5	
			2	VMC	21%	38	37	7.2	2.1	8.3	0.5	0.4	0.9	
			2	IMC	2%	36	38	2.6	20.9	22.9	0.3	1.3	1.6	
			3	VMC	1%	43	39	8.7	2.4	11.1	0.7	0.4	1.1	
			Weighted Delay (min)					**10.5**	**7.6**	**16.2**	**0.6**	**0.9**	**1.5**	
PAL 3														
325,775	1058	82	1	VMC	60%	37	46	44.3	7.6	50.2	4.5	1.3	5.9	**5.4**
			1	IMC	13%	39	43	36.7	21.6	58.2	4.3	2.8	7.1	
			2	VMC	21%	40	47	20.8	16.7	22.2	1.5	1.6	3.1	
			2	IMC	2%	35	46	72.5	30.0	91.1	9.3	1.7	10.9	
			3	VMC	1%	43	45	71.0	10.1	76.7	9.9	1.3	11.2	
			Weighted Delay (min)					**37.5**	**11.5**	**44.6**	**3.8**	**1.5**	**5.4**	

Source: RS&H Analysis, 2024.

4.4.2 Runway Requirements

This section describes the airfield runway geometric and safety standards, runway length, runway orientation, and runway designation.

4.4.2.1 Runway Standards

Analysis of the runways determines the geometric ability of the runways to meet FAA design standards based on the critical aircraft.

FAA Advisory Circular 150/5300-13B, *Airport Design* establishes runway geometry and separation standards for safety and efficiency. Runways consist of length, width, shoulder width, Runway Safety Area (RSA), Runway Object Free Area (ROFA), Runway Protection Zone (RPZ), Runway Obstacle Free Zone (ROFZ), runway separation, and taxiway separation. Runway geometry and separation depend on two criteria of the critical aircraft. Aircraft approach category (AAC) is defined by aircraft approach speed. Higher approach speeds require greater geometry and separation distances. Airplane Design Group (ADG) is defined by the tail height and wingspan of the critical aircraft. Larger aircraft require greater geometry and separation standards when on the ground. The existing and future critical aircraft at ANC is the Boeing 747-8F throughput the master plan horizon. This aircraft is categorized as AAC-D and ADG-VI.

Table 4-7 describes the runway dimensional design standards and if they are met for all runways at ANC. All elements of the runway infrastructure at ANC meet FAA design standards. However, the way in which the Runway 7R blast pad standards are met is non-traditional. The Runway 7R blast pad meets standards though it does not have a marked blast pad area. This is because there is no taxiway access to the Runway 7R end and back-taxiing to the west of Taxiway J is prohibited. Therefore, the full-strength Runway 7R pavement west of the Taxiway J intersection serves as a blast pad to meet the FAA requirement for aircraft departing Runway 7R.

Table 4-7
Runway Dimensional Design Standards

Criteria		ADG VI Dimensional Standard	ADG V Dimensional Standard	Runway 15-33	Runway 7L-25R	Runway 7R-25L
Runway Design Code (RDC)				D-VI-1200 / D-VI-5000	D-V-1200 / D-V-VIS	D-VI-1200 / D-VI-VIS
Runway Width		150'	150'	200'	150'	200'
Runway Shoulder Width		50'	35'	60'	70'	40'
Runway Safety Area Width		500'	500'	500'	500'	500'
Runway Safety Area Length Prior to Threshold		600'	600'	1,000'	1,000'	1,000'
Runway Safety Area Length Beyond Runway End		1,000'	1,000'	1,000'	1,000'	1,000'
Runway Object Free Area Width		800'	800'	800'	800'	800'
Runway Object Free Area Length Prior to Threshold		600'	600'	1,000'	1,000'	1,000'
Runway Object Free Area Length Beyond Runway End		1,000'	1,000'	1000'	1000'	1000'
Precision Obstacle Free Zone Length		200'	200'	200' / N/A	200'	N/A
Precision Obstacle Free Zone Width		800'	800'	800' / N/A	800'	N/A
Approach Runway Protection Zone Dimensions	Outer	1,750'	1,750'	1,750' / 1,010'	1,010' / 1,750'	1,010' / 1,750'
	Inner	1,000'	1,000'	1,000' / 500'	500' / 1,000'	500' / 1,000'
	Length	2,500'	2,500'	1,700' / 2,500'	2,500' / 1700'	2,500' / 1700'
Departure Runway Protection Zone Dimensions	Outer	1,010'	1,010'	1,750' / 1,010'	1,010' / 1,750'	1,010' / 1,750'
	Inner	5,00'	500'	1,000' / 500'	500' / 1,000'	500' / 1,000'
	Length	1,700'	1,700'	1,700' / 2,500'	2,500' / 1700'	2,500' / 1700'
Runway Obstacle Free Zone Width		400'	400'	400'	400'	400'
Runway Obstacle Free Zone Length		200'	200'	200'	200'	200'
Runway Centerline to Taxiway / Taxilane Separation		500'	500'	500'	500'	600'
Runway Centerline to Parallel Runway Centerline		300'	300'	N/A	700'	700'
Runway Centerline to Hold Separation		280'	280'	280'	280'	280'
Blast Pad Width		250'	220'	280 / 280'	280 / 280'	280 / 280'
Blast Pad Length		400'	400'	400' / 400'	400' / 400'	600' / 200'

Source: RS&H Analysis, 2024; FAA Advisory Circular 150/5300-13B, Change 1 *Airport Design*
Notes: Red font color indicates standard not met.
* FAA Advisory Circular 150/5300-13B, Change 1 *Airport Design*, Table G-12 footnotes state ADG VI paved runway shoulders are 50 feet and paved blast pad width is 250 feet.

4.4.2.2 Runway Length

This analysis focused on the most frequent and demanding aircraft forecast to operate at ANC. This generally includes the large intercontinental cargo aircraft which frequently stop at ANC for technical stop operations while transiting between Asia, Europe, and the Americas.

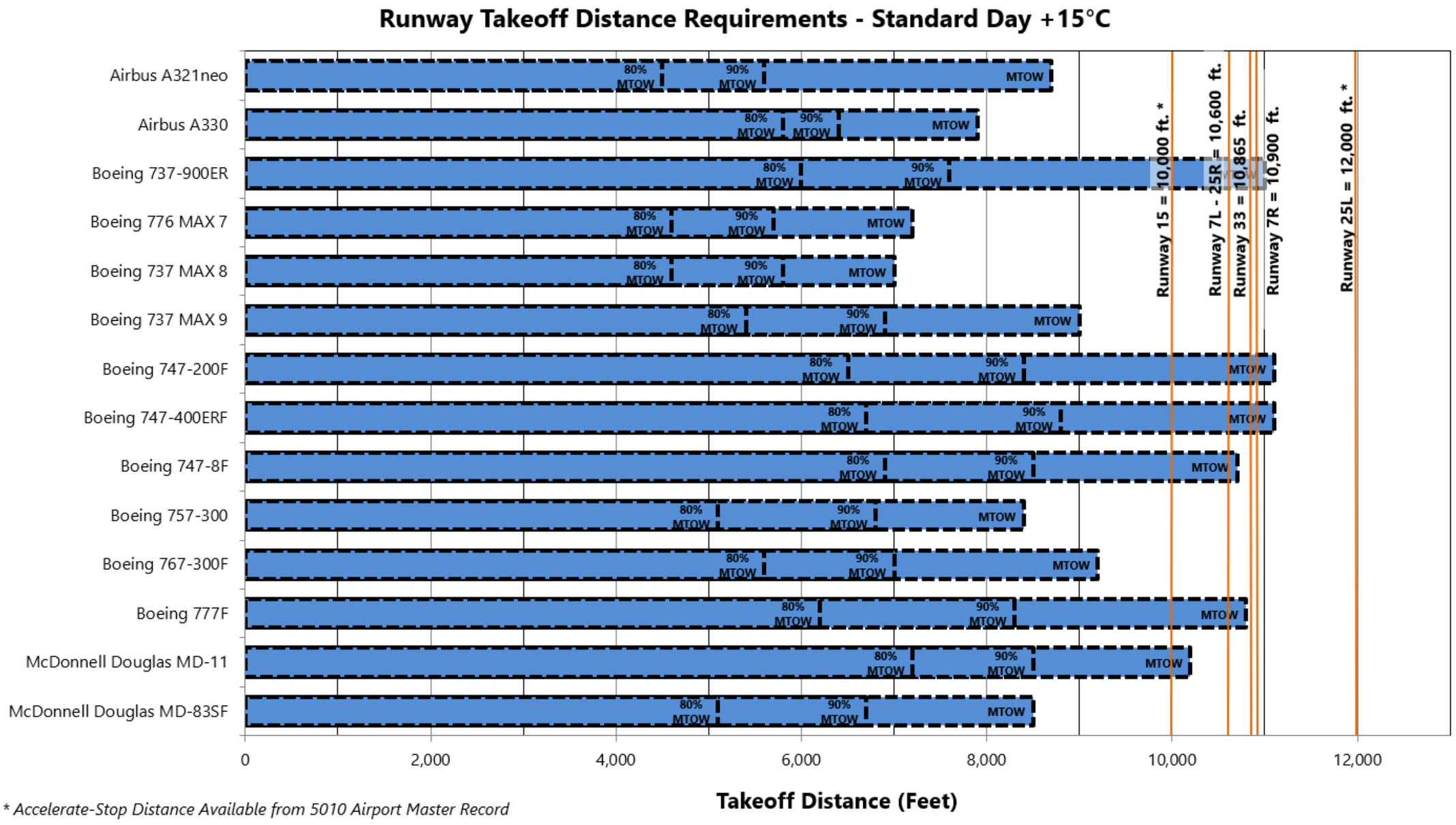
The runway length analysis at ANC was conducted for both takeoff and landing operations. FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design* outlines the criteria that must be considered with this analysis. The aircraft performance data used in this analysis was gathered from airport planning documents from aircraft manufacturers, which provide aircraft performance data under a variety of conditions.

Meteorological conditions for this analysis represent the average high temperature of the hottest month to represent demanding weather conditions. Warmer weather results in less dense air, also known as a higher density altitude, as well as degraded engine performance. The most demanding aircraft to regularly use the runways are the Boeing 747 series of aircraft (Boeing 747-4ERF, Boeing 747-8F), the Boeing 777F series of aircraft, and the Boeing 737 MAX series of aircraft. Airbus 380 aircraft may arrive occasionally for diversions or emergencies, but the type and frequency of operation does not meet the FAA regular use threshold.

This analysis considers takeoff performance for aircraft at 80%, 90%, and 100% of the aircraft's Maximum Takeoff Weight (MTOW). The analysis of landing performance at ANC evaluated the distance an aircraft is projected to use in scenarios where the runway is dry, as well as when it is contaminated, or when there is precipitation on the surface. Contaminated surfaces impact braking performance, meaning more distance is required for an aircraft to stop.

The existing runway infrastructure can accommodate the forecast takeoff and landing distance requirements for the fleet throughout the planning period. Additional runway length is not required to accommodate the forecast demand. Some aircraft have takeoff performance that may require a takeoff distance longer than the length of the shorter runways; however, all aircraft requirements for takeoff are met by the current length of Runway 25L for the average high of the hottest month. The takeoff and landing distance required for each aircraft are depicted in **Figure 4-14** and **Figure 4-15**.

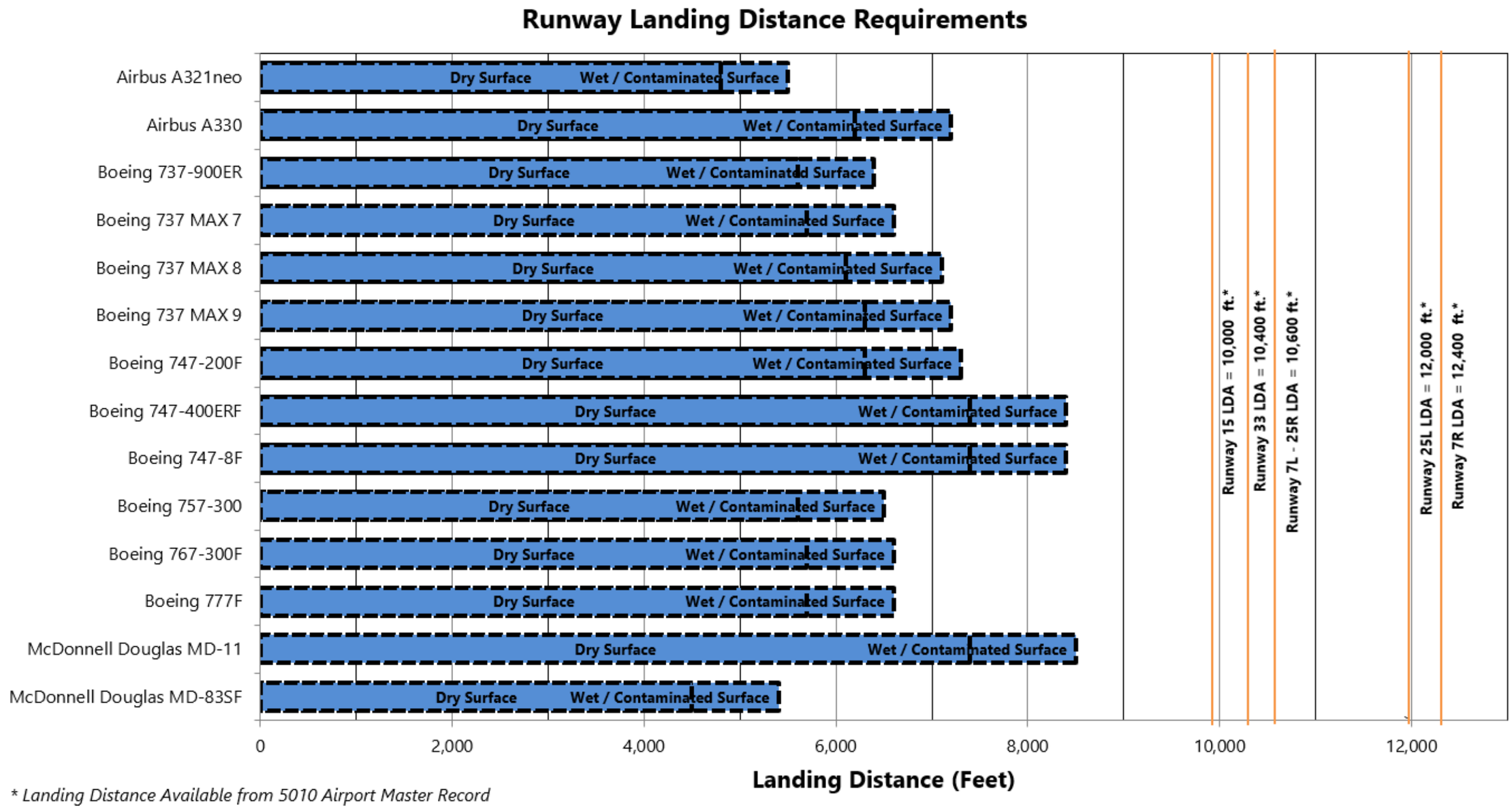
Figure 4-14
Takeoff Distance Requirements



** Accelerate-Stop Distance Available from 5010 Airport Master Record*

Sources: RS&H Analysis, 2024; Aircraft Characteristics Airport and Maintenance Planning, Airbus; Airplane Characteristics for Airport Planning (Various), Boeing.

Figure 4-15
Landing Distance Requirements



** Landing Distance Available from 5010 Airport Master Record*

Sources: RS&H Analysis, 2024; Aircraft Characteristics Airport and Maintenance Planning, Airbus; Airplane Characteristics for Airport Planning (Various), Boeing.

4.4.2.3 Runway Orientation

Prevailing winds are the primary factor in determining runway orientation, as aircraft perform best when landing into and taking off into the wind. FAA Advisory Circular 150/5300-13B, *Airport Design* outlines that runway orientations must allow for at least 95% of traffic to land in various weather conditions and crosswind allowances, making runway alignment with prevailing winds necessary.

The following runway wind coverage analysis considers ten years of meteorological data (January 2013 through December 2023) from the National Climactic Data Center for wind speed and direction in all-weather, Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions. Crosswind component, or the amount of perpendicular crosswind an aircraft will experience during landing, is analyzed at 10.5 knots, 13 knots, 16 knots, and 20 knots. These ranges of visibility and crosswind components account for the wide range of weather and size of aircraft landing at ANC, giving a more comprehensive understanding of runway wind coverage in all conditions.

Some runway/crosswind component configurations do not have 95% coverage in all-weather and VFR weather conditions using just Runway 7L, Runway 7R, Runway 25L, and Runway 25R at 10.5 knots and 13 knots of crosswind component. This means that if only these runways are in use, aircraft that can only operate with low crosswind components (e.g., small general aviation aircraft) will not be able to operate at ANC. This would mean these aircraft would need to use Runway 33 or Runway 15, wait for more favorable weather conditions, or divert to another airport (if already airborne).

The combined runway configuration system is satisfactory to meet current and future conditions at ANC, with combined coverage exceeding 99% in all weather conditions and crosswind components. The coverage for each crosswind and meteorological conditions at ANC is depicted in **Table 4-8**.

Table 4-8
Wind Coverage Analysis

Runway and Crosswind Component	All-Weather Wind Coverage	VFR Wind Coverage	IFR Wind Coverage
Runway 15-33			
10.5 Knots	98.92%	98.85%	99.28%
13 Knots	99.52%	99.49%	99.64%
16 Knots	99.88%	99.88%	99.87%
20 Knots	99.96%	99.97%	99.92%
Runway 7-25 (Parallel Runways)			
10.5 Knots	89.41%	88.15%	97.40%
13 Knots	93.61%	92.32%	98.48%
16 Knots	97.81%	97.52%	99.69%
20 Knots	99.56%	99.51%	99.91%
Combined			
10.5 Knots	99.49%	99.45%	99.72%
13 Knots	99.87%	99.86%	99.92%
16 Knots	99.95%	99.95%	99.93%
20 Knots	99.98%	99.99%	99.94%

Source: FAA ADIP, 2023

4.4.2.4 Runway Designation

Every runway has two associated directional headings. A true heading, or the direction toward which it is physically oriented that will not change unless the runway is realigned, and a magnetic heading, which is determined by the runway's orientation along with an adjustment for magnetic declination. A runway's magnetic heading is important for pilots since they use magnetic compasses to determine their heading while in flight. Runway designations are provided on each runway to indicate the runway orientation according to the magnetic compass bearing. Runway 15-33 is oriented at 149° and 329° to magnetic North. Runways 7L-25R and 7R-25L are oriented at 74° and 254° to magnetic North.

The magnetic bearing of a runway can change over time and runway designations must occasionally be updated due to the slow drift of the magnetic poles on the Earth's surface in relation to the location of the Airport. It is industry standard that a runway designation be considered when the runway magnetic heading shifts more than 5° from the runway marking designation.

The change in magnetic heading, known as magnetic drift, occurs over time due to magnetic variation and deviation as the Earth's crust and Earth's magnetic sphere interact. The amount of

drift that is experienced is also dependent on location and proximity to North Pole, and as a result ANC experiences much more drift than many other airports in the United States.

An analysis on runway magnetic declination has been conducted at ANC over the course of the planning period. ANC experiences a rate of magnetic variance of ANC is 14.50° E ± 0.27° as of August 2020. The current rate of change is 0.25° W per year.

Under the current magnetic variance, the runway designations at ANC are not anticipated to change over the planning period. Current and future designations and bearings are depicted in **Table 4-9**.

Table 4-9
Runway Designation

Runway Designation	Runway Heading	Magnetic Bearing (2023)	Magnetic Bearing (2042)	Requirements Met (✓)
Runway 15	150°	150° 2' 49"	145° 17' 49"	✓
Runway 33	330°	330° 2' 49"	325° 17' 49"	✓
Runway 7L	75°	75° 2' 49"	70° 17' 49"	✓
Runway 25R	255°	255° 2' 49"	250° 17' 49"	✓
Runway 7R	75°	75° 1' 1"	70° 16' 1"	✓
Runway 25L	255°	255° 1' 1"	250° 16' 1"	✓

Source: RS&H Analysis, 2024; NOAA, 2023.

4.4.3 Taxiway / Taxilane Requirements

The taxiway and taxilane requirements analysis includes review of the FAA design standards and runway incursion concerns that result in hot spots.

4.4.3.1 Taxiway / Taxilane Standards

The taxiway and taxilane layout and width were analyzed to determine if existing runways meet current and future needs. Analysis of the taxiways address the geometric ability of the taxiways to meet FAA design standards based on the critical aircraft. Elements examined in this section include taxiway widths, clearance and protection design standards, and geometry best practices. Aircraft are categorized by ADG and Taxiway Design Group (TDG), the latter of which is defined by an aircraft's cockpit to main gear dimension and the width of the main gear. The higher the number, the more demanding the aircraft is to taxiway infrastructure, since the aircraft will be wider and have a wider minimum taxiing radius.

Taxiways and taxilanes at ANC have been analyzed to determine if they meet ADG and TDG standards. These standards include taxiway and taxilane width, taxiway edge safety margin, and

taxiway shoulder size. Taxiway and taxilane separation from centerlines and runways have also been measured. ANC taxiways are generally designed to be ADG VI or ADG III since the critical aircraft of a Boeing 747-8F is categorized as a ADG-VI aircraft and the passenger aircraft operations at ANC are most often ADG-III aircraft.

Taxiways and taxilanes are generally satisfactory for the aircraft that use them, with some minor non-standard taxiway safety area width and taxiway shoulder width conditions, with the exception of some taxilanes near the North Terminal building. These taxilanes are non-standard due to the area around the North Terminal building being confined by the building itself and other associated infrastructure, such as blast fences. There are several non-standard angled taxiways between parallel runways and to the apron area; these are: Taxiway C, Taxiway D, Taxiway E, Taxiway G, Taxiway G1, and Taxiway R. Taxiway V has an at-grade intersection with a public road, which is highly unusual for an airport and a non-standard condition; however, it provides a vital connection to Lake Hood Airport (LHD).

Taxiway and taxilane criteria, requirements, and standards analysis is depicted in **Table 4-10** and **Table 4-11**.

Table 4-10
Taxiway Standards

Taxiway Components	Taxiway Width	Taxiway Shoulder Width	Taxiway Safety Area Width	Taxiway Object Free Area	Requirement Met (✓)
Requirement (ADG I TDG 2B)	**25'**	**10'**	**49'**	**89'**	
Taxiway V	35'	20'	135'	135'	✓
Requirement (ADG III TDG 3)	**50'**	**20'**	**118'**	**171'**	
Taxiway R (S of Taxiway Z)	50'	34'	118'	132.5'	✓
Taxiway F (S of Taxiway Z)	50'	34'	118'	85.5'	✓
Requirement (ADG III TDG 4)	**50'**	**20'**	**118'**	**171'**	
Taxiway E (South of Runway 7R-25L)	100'	20'	118'	167.5'	✓
Requirement (ADG V TDG 6)	**75'**	**30'**	**214**	**285'**	
Taxiway H (S of 7L-25R)	75'	35'	214'	142.5	✓
Requirement (ADG VI TDG 6)	**75'**	**30'**	**262'**	**335'**	
Taxiway A	125'	40'	262'	167.5'	✓
Taxiway B	110'	55'	262'	167.5'	✓
Taxiway C (N of 7R-25L)	120'	65'	262'	167.5'	✓
Taxiway C (S of 7R-25L)	100'	80'	262'	167.5'	✓
Taxiway D (N of 7R-25L)	125'	40'	262'	167.5	✓
Taxiway D (S of 7R-25L)	120'	40'	262'	167.5'	✓
Taxiway E (Between Taxiway K and 7L)	100'	60'	262'	167.5'	✓
Taxiway E (Between Runways)	75'	110'	262'	167.5'	✓
Taxiway F (N of Taxiway Z)	75'	35'	**171'**	167.5'	**X**
Taxiway H (N of 7L-25R)	130'	42.5'	262'	167.5'	✓
Taxiway J	100'	55'	262'	167.5'	✓
Taxiway K (W of Taxiway C)	100'	40'	262'	167.5'	✓
Taxiway K (E of Taxiway C)	75'	40'	262'	167.5'	✓
Taxiway L (Taxiway R to Taxiway E)	110'	30'	262'	167.5'	✓
Taxiway L (Taxiway R to Taxiway Y)	100'	40'	262'	167.5'	✓
Taxiway M (W of Taxiway R)	95'	40'	262'	167.5'	✓
Taxiway M (E of Taxiway R)	95'	40'	262'	167.5'	✓
Taxiway Q	105'	40'	262'	167.5'	✓
Taxiway R (N of 7R-25R)	100'	**27.5'**	262'	167.5	**X**
Taxiway R (N of Taxiway T)	100'	40'	262'	167.5'	✓
Taxiway S (W of Taxiway R)	107.5	40'	262'	167.5'	✓
Taxiway S (E of Taxiway R)	107.5'	40'	262'	167.5'	✓
Taxiway T (W of Taxiway R)	110'	40'	262'	167.5'	✓

Taxiway Components	Taxiway Width	Taxiway Shoulder Width	Taxiway Safety Area Width	Taxiway Object Free Area	Requirement Met (✓)
Taxiway T (E of Taxiway R)	110'	40'	262'	167.5	✓
Taxiway U (W of Taxiway R)	110'	40'	262'	167.5'	✓
Taxiway U (E of Taxiway R)	110'	40'	262'	167.5'	✓
Taxiway W	83.5'	40'	262'	167.5'	✓
Taxiway Y	87.5'	33.5'	262'	167.5'	✓

Source: RS&H Analysis, 2024; FAA Advisory Circular 150/5300-13B, Change 1 Airport Design.
Note: Red font color indicates standard not met.

Table 4-11
Taxilane Standards

Taxilane Components	Taxilane Width	Taxilane Safety Area Width	Taxilane Object Free Area	Requirement Met (✓)
ADG I TDG 2B Standard	**35'**	**49'**	**79′**	
Taxiway V (E of Taxiway E)	35'	79'	79'	✓
ADG III, TDG-5 Standard	**75'**	**118'**	**158'**	
Taxilane S (E of UPS)	75'	**100'**	**100'**	**X**
ADG IV TDG 6 Standard	**75'**	**171'**	**224'**	
Taxilane F (S of Taxiway Z)	75'	171'	224'	✓
ADG V TDG 6 Standard	**75'**	**214'**	**270'**	
North Terminal Taxilane	75'	214'	**252'**	**X**
ADG VI TDG 6 Standard	**75'**	**262'**	**322'**	
Taxilane E (N of Taxiway M)	100'	262'	**292'**	**X**
Taxilane E (Between Taxiway M and Taxiway K)	100'	390'	322'	✓
Taxilane E1	75'	262'	322'	✓
Taxilane E2	75'	262'	322'	✓
Taxilane E3	75'	262'	322'	✓
Taxilane G1 (Between Taxiway L and Taxiway M)	75'	300'	300'	✓
Taxilane G1 (S of Taxiway L)	100'	262'	322'	✓
Taxilane G1 (N of Taxiway M)	100'	300'	300'	✓
Taxiway M (E of Taxiway R)	130'	262'	322'	✓
Taxilane P	100'	262'	322'	✓
Taxilane S (Tower Road to ACP)	100'	262'	322'	✓
Taxilane U (E of Taxiway R)	**50'**	262'	322'	**X**

Source: RS&H Analysis, 2024; FAA Advisory Circular 150/5300-13B, Airport Design.
Note: Red font color indicates standard not met.

4.4.3.2 Hot Spots

The FAA defines a hot spot as "a location on an airport movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary." The FAA states that hot spots have a history or potential risk of collision or runway incursion and require heightened attention by pilots and drivers. These areas are the most at-risk to present dangerous vehicle conflicts and are undesirable. Hot spots should be mitigated if provided an opportunity to do so, as hot spot mitigation enhances airport safety.

Hot spots are indicated on FAA documents such as Airport Diagrams to promote awareness of these areas and the potential hazards they present. FAA Advisory Circular 150/5300-13B, *Airport Design* also emphasizes mitigation measures be prioritized throughout the planning process, especially when addressing non-standard airport conditions.

ANC has two FAA identified hot spots. The hot spots are the result of non-standard taxiway geometry in two locations. The non-standard geometry includes taxiways with intersections with more than three paths an aircraft can take, and a non-perpendicular taxiway intersection on a short taxiway between two runways.

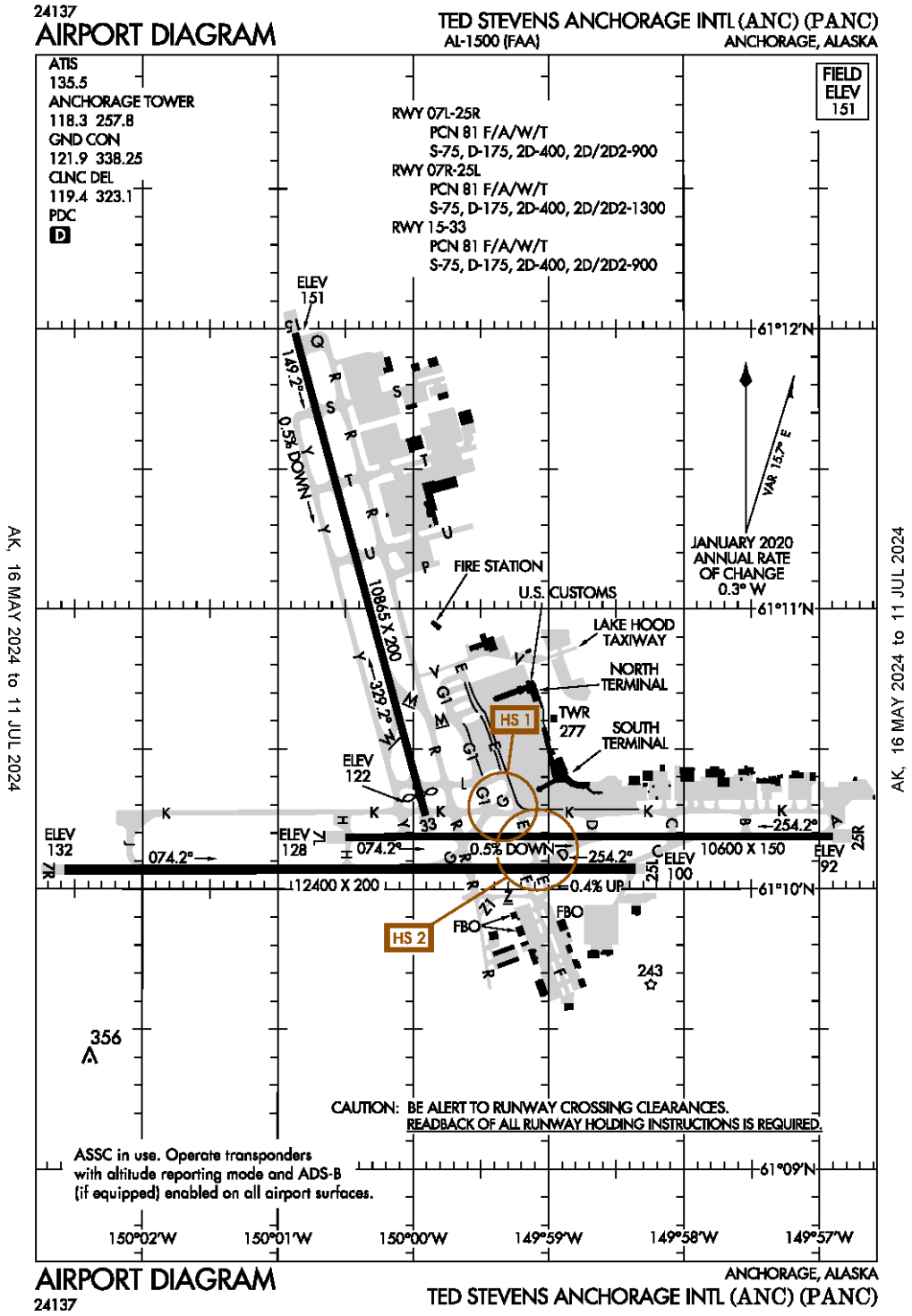
The two ANC hot spots are depicted in **Figure 4-16** and have the following description:

- Hot Spot 1 occurs when aircraft taxiing via Taxiway E to Taxiway G and Taxiway K to Runway 33 sometimes miss the turn from Taxiway G on to Taxiway K and continue on Taxiway G across Runway 07L–25R by mistake, especially with restricted visibility.

- Hot Spot 2 occurs when aircraft taxiing to Taxiway K via Taxiway E and Taxiway F may confuse hold short instructions for Runway 07R–25L and 07L–25R. Taxiway D signage may not be visible from Taxiway E and Taxiway F hold positions.

The Master Plan recommends that resolution of these hot spots be pursued to improve airfield safety. Options to resolve these hot spots are addressed in the Alternatives Chapter.

Figure 4-16
Location of Hot Spot 1 and Hot Spot 2



Source: FAA, 2024

4.4.4 NAVAIDs

Navigational aids (NAVAIDs) and lighting consist of equipment to help pilots locate an airport, navigate in and out of the airport, and know its weather conditions. NAVAIDs provide information to pilots about aircraft horizontal alignment, height above the ground, location of airport facilities, and aircraft position on the airfield. Visual, electronic, and meteorological of NAVAIDS were assessed at ANC. ANC operates under challenging weather conditions with a high volume of a diverse fleet. NAVAIDs are integral in supporting these operations, as they facilitate safe, efficient, and orderly airport operations in all conditions.

Runway 7L, Runway 7R, Runway 15, and Runway 33 are equipped with instrument approaches. Runway 7L is the only runway equipped with Category III (CAT III) Instrument Landing System (ILS) approach capability. All other runways (except Runway 33) are equipped with Category I (CAT I) ILS approaches. There is also an airport surveillance radar (ASR) in the West Airpark, north of the fuel farm. This ASR will need to be re-sited, as this area is under development and will have its radar impacted by buildings and aircraft obstructing its line of site.

To maintain operations volume in inclement weather, Runway 7R should undergo an upgrade in its ILS approach from CAT I to CAT III. This would allow for more operational flexibility during IFR and during winter weather operations, as when Runway 7L is not available for arrivals then Runway 7R can be used in its place. As mentioned earlier, the ASR will also need to be re-sited in the future to promote orderly development of ANC.

4.5 Terminal Requirements

The terminal facility requirements include aircraft parking positions and the South Terminal building. This section describes the methodology and results of the analysis conducted to determine the requirements for these terminal elements.

4.5.1 Aircraft Parking Position Requirements

An analysis was conducted to determine the number and size of aircraft parking positions required to accommodate the forecast demand for commercial service passenger aircraft operations. The aircraft parking position requirements analysis was completed using the CAST simulation model software. CAST is a fast-time simulation software that allows for realistic analysis of different functional areas of an airport, including aircraft parking areas and passenger terminal facilities. The model relies on inputs that represent real-world environments to produce a realistic analysis result.

The CAST model for the ANC Airport Master Plan was prepared using the design day flight schedules that were prepared as part of the aviation demand forecast phase. The analysis model also considered existing aircraft parking position allocations used at ANC to calculate the requirement. Generally, airline allocations used in the summer of 2022 were used as the basis of the airline allocations throughout the planning period. This includes the assumption that the B Concourse aircraft parking positions can be used as overflow when the C Concourse positions reach capacity. However, the reverse is not true; the C Concourse cannot be used as overflow when the B Concourse demand exceeds capacity.

This includes parking position allocation limitations based on aircraft size. Further, the analysis assumed that the North Terminal is available for arriving international passenger service aircraft and those passenger service aircraft would be towed to the B Concourse at the South Terminal prior to departure. This analysis consideration aligns with the typical international arrival and departure operations from 2022.

The analysis was completed for each PAL and the aircraft parking position requirement was identified based on the demand associated with the peak 30-minute period. The analysis results are summarized based on the following gating areas:

- North Terminal
- A Concourse South Terminal
- B Concourse South Terminal
- C Concourse South Terminal
- L Gates South Terminal

The analysis results indicate that the aircraft parking demand for the North Terminal is two positions throughout the planning period. This result is representative of the minimal but steady peak period demand for passenger international arrivals. The eight existing aircraft parking positions at the North Terminal are sufficient to accommodate this demand for passenger international arrivals throughout the planning period.

The analysis results indicate that the peak period for the South Terminal aircraft parking area is as follows throughout the planning period:

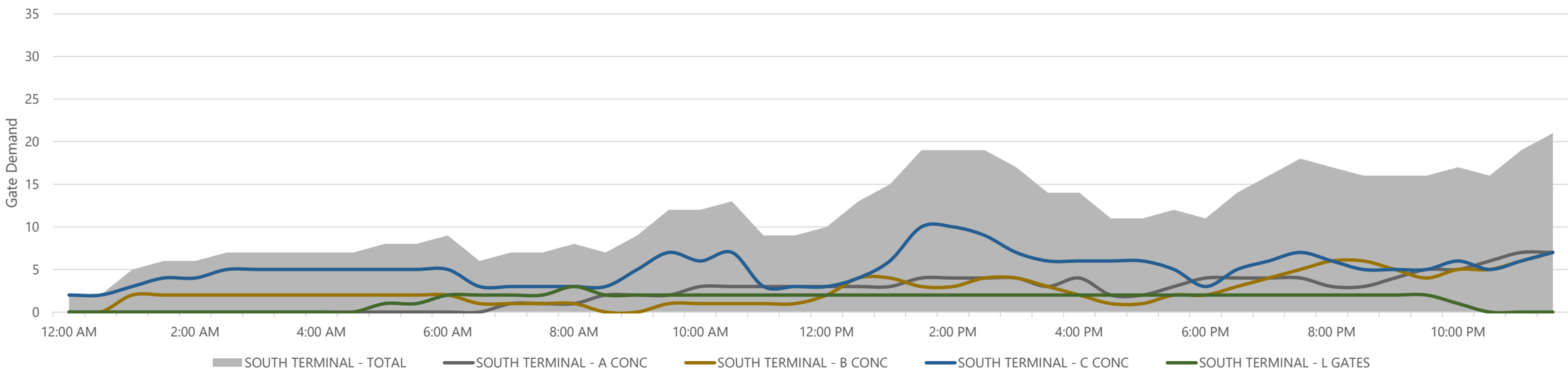
- A Concourse South Terminal – remain overnight (RON) starting at 11:00 PM
- B Concourse South Terminal – 10:00 PM – 12:00 AM
- C Concourse South Terminal – 1:30 PM – 2:30 PM
- L Gates South Terminal – 8:00 AM – 9:00 AM (Base & PAL 1) / 9:00 PM – 10:30 PM (PAL 2 & PAL 3)

The South Terminal gate demand for each aircraft parking area is depicted in **Figure 4-17**, **Figure 4-18**, **Figure 4-19**, and **Figure 4-20**. The overall peak demand for aircraft parking positions at the South Terminal occurs at 10:00 PM – 12:00 AM. This is due in part to the high demand for airlines to operate redeye departures from ANC to hubs in the Lower 48. These redeye flights operate from the South Terminal B Concourse. The 10:00 PM – 12:00 AM gate demand peak is also attributed to the intrastate carrier aircraft that remain overnight at the terminal aircraft parking positions.

The aircraft parking position demand for PAL 3 for the B Concourse and C Concourse is depicted in **Figure 4-21**. The chart shows that the demand for the C Concourse aircraft parking positions exceed capacity during the daytime peak. However, most of the overflow demand can be accommodated on the B Concourse during the same time. This results in an unmet need for two gates/aircraft parking positions. Conversely, the demand for the B Concourse aircraft parking positions exceeds capacity during the last night peak. This results in an unmet need for seven gates/aircraft parking positions. **Table 4-12** summarizes the unmet gate/aircraft parking position count for the jet aicraft (i.e., B Concourse and C Concourse) and the intrastate carriers. A total of 10 aircraft parking positions are required to accommodate unmet demand by PAL 3. This includes eight jet positions and two intrastate positions. The eight jet positions account for accommodating one irregular operation (IROP) aircraft during the peak period.

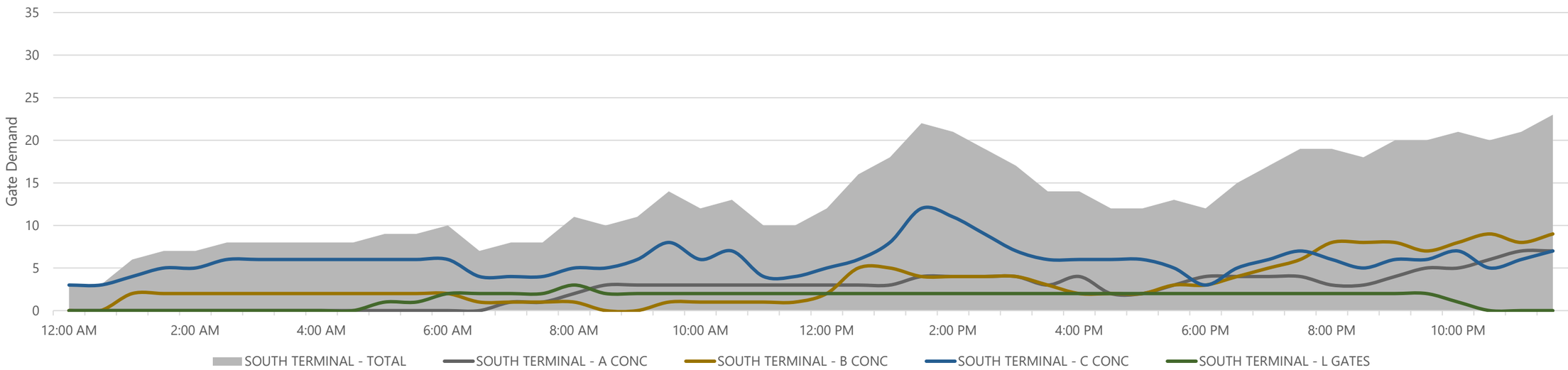
Analysis of the forecast fleet mix indicates that at least one aircraft parking position on the B Concourse should be able to accommodate an Airplane Design Group (ADG) V aircraft (e.g., Airbus A330, Airbus A350, Boeing 787). The existing aicraft parking position for Gate B8 can accommodate ADG-V aircraft so that requirement is met with existing infrastructure. The critical aircraft for the South Terminal aircraft parking areas are described in **Table 4-13**.

Figure 4-17
South Terminal Gate Demand – Base PAL



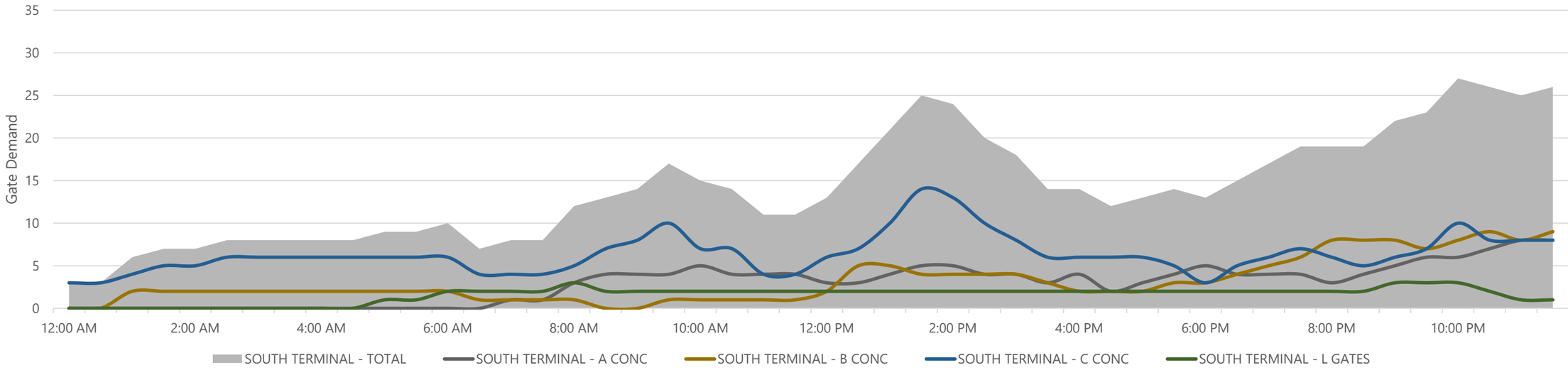
Source: RS&H Analysis, 2024.

Figure 4-18
South Terminal Gate Demand – PAL 1



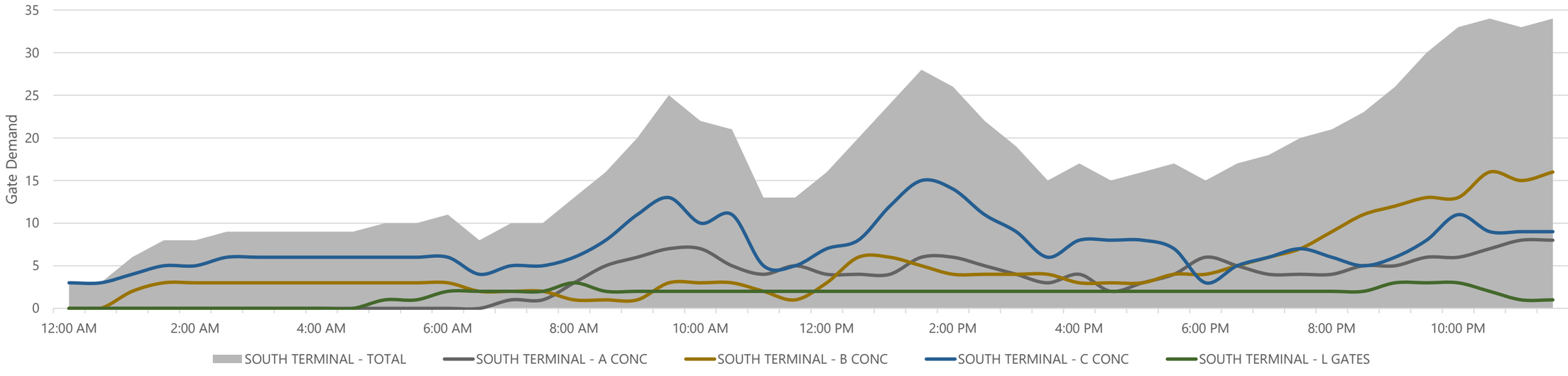
Source: RS&H Analysis, 2024.

Figure 4-19
South Terminal Gate Demand – PAL 2



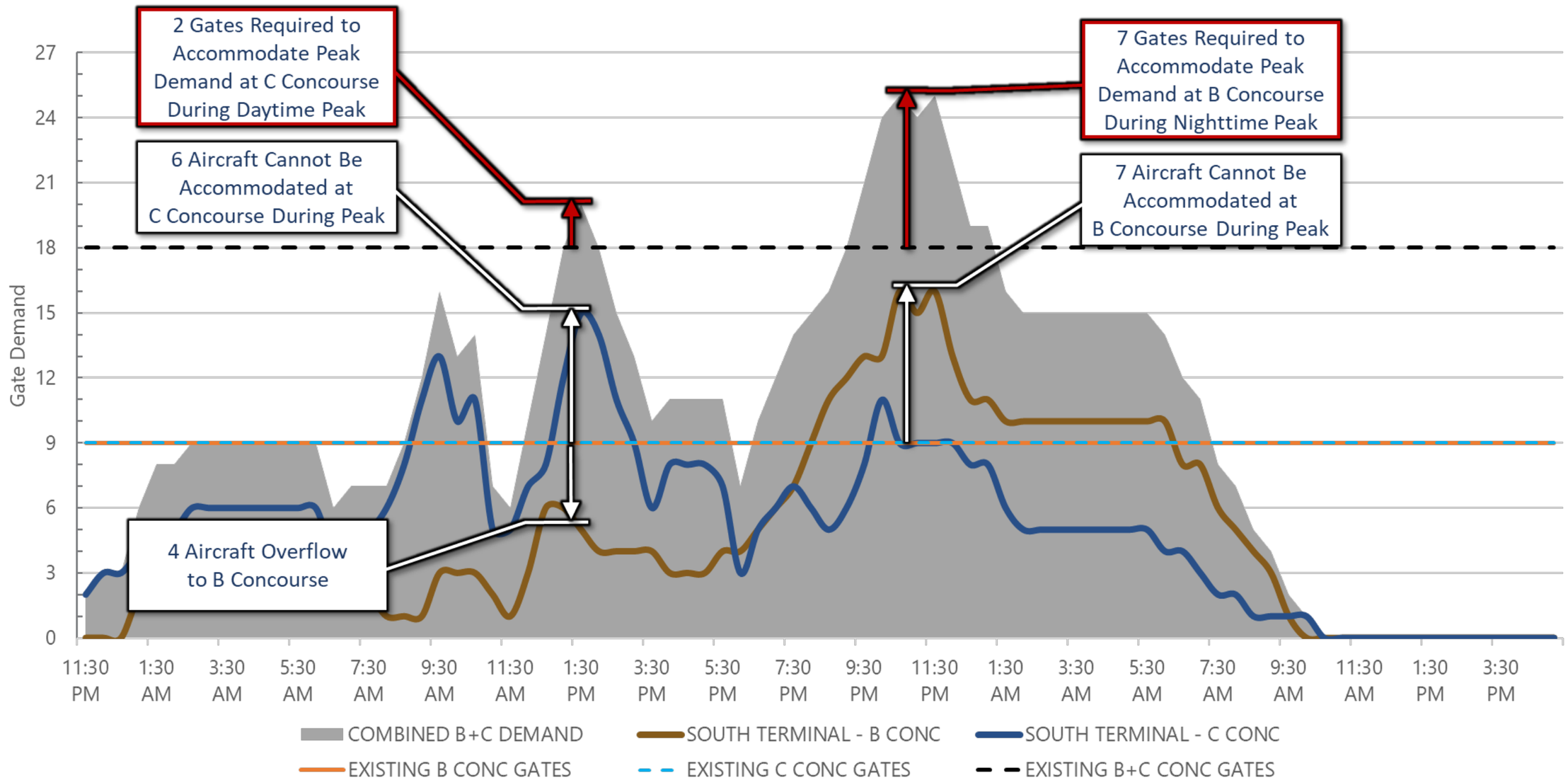
Source: RS&H Analysis, 2024.

Figure 4-20
South Terminal Gate Demand – PAL 3



Source: RS&H Analysis, 2024.

Figure 4-21
B Concourse and C Concourse Aircraft Parking Demand – PAL 3



Source: RS&H Analysis, 2024.

Table 4-12
Terminal Aircraft Parking Position Requirements Summary

	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
Jet Position Summary					
Peak Time Period	-	11:30 PM	11:30 PM	11:30 PM	11:30 PM
B Concourse Positions	9	7	9	9	16
Surplus/(Deficit) (Count)	-	2	0	0	(7)
C Concourse Positions	9	7	7	8	9
Surplus/(Deficit) (Count)	-	2	2	1	0
Jet Positions Subtotal	18	14	16	17	25
Surplus/(Deficit) (Count)	-	4	2	1	(7)
Jet Gate Total *(includes +1 for IROP)*[1]	18	15	17	18	26
Surplus/(Deficit) (Count)	-	3	1	0	(8)
Turboprop Position Summary					
Peak Time Period	-	11:30 PM	11:30 PM	11:30 PM	11:30 PM
A Concourse Positions	6	7	7	8	8
Surplus/(Deficit) (Count)	-	(1)	(1)	(2)	(2)
L Gate Positions	4	0	0	1	1
Surplus/(Deficit) (Count)	-	4	4	3	3
Turboprop Positions Total	10	7	7	9	9
Surplus/(Deficit) (Count)	-	3	3	1	1

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. IROP = Irregular operation.

Table 4-13
Critical Aircraft for South Terminal Aircraft Parking Positions

	Demand			
	Base	PAL 1	PAL 2	PAL 3
A Concourse	Dash 8-300	Dash 8-300	ATR 72	ATR 72
B Concourse	Boeing 737-MAX 9 Boeing 767-300W	Boeing 737-MAX 9 Boeing 767-300W	Boeing 737-MAX 9 Airbus A330-300	Boeing 737-MAX 9 Airbus A330-300
C Concourse	Boeing 737-MAX 9	Boeing 737-MAX 9	Boeing 737-MAX 10	Boeing 737-MAX 10
L Gates	Cessna 208 Caravan	Cessna 208 Caravan	Cessna 208 Caravan	Cessna 208 Caravan

Source: RS&H Analysis, 2024

4.5.2 South Terminal Building Requirements

An analysis was completed to determine the facility requirements for the forecast passenger air carrier demand for the South Terminal building.
The analysis included evaluation of the following functional areas:

- Airline Area
- Security Screening Checkpoint
- Outbound Baggage Screening
- Outbound Baggage Make-up
- Holdrooms

A CAST model was prepared to support the South Terminal building facility requirements analysis. The CAST model was prepared based on the South Terminal building configuration, as of Summer 2022. This included building operational characteristics like passenger processing times at key functional areas (e.g., ticketing, security screening checkpoint). It also included general passenger behavior (e.g., checked bag ratios). The design day flight schedules for each PAL were run in the CAST model using the 2022 South Terminal building configuration.

Industry standard references, like Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*, were used in along with the CAST simulation model to calculate the facility requirements. A description of the methodologies used for each functional area is included in the subsections below.

4.5.2.1 Airline Area

The airline area includes the airline ticketing counter area and airline operations area. The airline ticketing areas include space for self-serve kiosks, staffed counter positions, and ticket office space. The airline operations spaces are nonpublic areas that are typically used by airline personnel to support the ground operations.

The CAST simulation model was used to calculate the number of ticket counter agent positions, bag drop counter positions, and self-serve kiosk positions required for each PAL. The CAST analysis incorporated the passenger airline allocation during the peak hour of the design day to calculate the required number of positions. The peak hour requirement also accounts for passenger demand and processing throughput rates for staff and self-service positions.

Industry standard counter width metrics were used to calculate the total counter lengths for the ticket counter agent positions and bag drop counter positions. The counter lengths were applied to industry standard metrics to calculate the active area and queuing area for ticket counter positions, bag drop positions, and self-serve kiosk positions. The active area is defined as the area immediately in front of the counter and kiosk position where passengers are actively

being processed. The queuing areas precedes the active areas and represent areas where passengers are waiting in line to access the counter or kiosk. Airline ticket office space was also calculated based on function of the ticket counter frontage. The requirements for the airline ticketing area are described in **Table 4-14**.

Table 4-14
South Terminal Airline Ticketing Area Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Ticket Counter Area					
Counter Length (lf)	455	350	370	400	450
Length Surplus/(Deficit) (lf)	-	105	85	55	5
Self-Service Kiosk Area (sf)	-	40	50	60	60
Baggage Drop Area (sf)	-	330	390	390	500
Ticket Counter Area (sf)	-	3,200	3,350	3,625	4,025
Area Subtotal (sf)	5,400	3,570	3,790	4,075	4,585
Subtotal Surplus/(Deficit) (lf)	-	1,830	1,610	1,325	815
Queuing and Active Area					
Self-Service Kiosk Queuing and Active Area (sf)	-	500	600	700	700
Baggage Drop Queuing and Active Area (sf)	-	800	1,000	1,000	1,800
Ticket Counter Queueing and Active Area (sf)	-	11,200	11,700	12,700	14,100
Area Subtotal (sf)	13,300	12,500	13,300	14,400	16,600
Subtotal Surplus/(Deficit) (lf)	-	800	0	(1,100)	(3,300)
Total Airline Ticket Office					
Area Subtotal (sf)	10,200	8,000	8,400	9,100	10,000
Subtotal Surplus/(Deficit) (lf)	-	2,200	1,800	1,100	200
Total Ticketing Area					
Total Ticketing Area (sf)	28,900	24,070	25,490	27,575	31,185
Area Surplus/(Deficit) (sf)	-	4,830	3,410	1,325	(2,285)

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. sf = square feet. lf = linear feet

The analysis results show that the PAL 2 demand for the existing queuing and active area exceeds the existing capacity, and the PAL 3 demand exceeds the overall ticketing area space. Additional space is required in front of the counter positions and kiosks to accommodate the number of passengers that will be waiting to be processed as peak hour demand increases throughout the planning period.

The analysis results do not show a need for additional counter positions based on analysis of the design day flight schedule; however, this should be reassessed as demand increases. It is important to note that the design day flight schedules do not include new entrant carriers. The forecast and design day flight scheduled identify the passenger demand likely to operate at ANC throughout the planning period and assumes that passenger demand will be accommodated by existing carriers through increased frequency and aircraft upgauging. This is a common way to represent passenger demand and the assumption does not affect the facility requirements analysis for any other functional area; however, it can result in an understated need for ticket counters. This is because new entrant carriers would likely process passengers from leased proprietary use counters which may result in a demand for counters beyond the requirement. Therefore, it is recommended that the terminal alternatives consider options for flexible and phased ticketing area expansion to accommodate new entrant carriers.

A planning factor between the existing airline operations space and airline ticketing area was calculated to determine the airline operations administration space requirements. That planning factor was applied to the required airline ticketing area to calculate the requirements. The analysis results show that the PAL 3 demand for airline operations administrative space exceeds the existing capacity. The airline operations area requirements are described in **Table 4-15**.

Table 4-15
South Terminal Airline Operations Administrative Space Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Airline Operations Admin Space (sf)	34,600	28,800	30,600	33,000	37,300
Area Surplus/(Deficit) (sf)	-	5,800	4,000	1,600	(2,700)

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. sf = square feet.

4.5.2.2 Security Screening Checkpoint

The requirements for the passenger security screening checkpoint (SSCP) were calculated using the CAST terminal model. The analysis evaluated the demand throughout the design day to identify the requirement for the peak hour. The assumption is that the SSCP requirements analysis would only consider enplaned forecast passengers for Part 121 air carriers. The analysis assumes that passengers allocated to other airlines that operate at the South Terminal would not be screened at the SSCP.

The International Air Transport Association (IATA) publishes the Airport Development Reference Manual (ADRM) which includes Level of Service (LOS) metrics for passenger operations within the terminal. IATA recommends planning for the 'Optimum' LOS range for each facility. An

Optimum facility will provide a very good passenger experience and acceptable queueing times without incurring excessive capital or operating costs. Version 11 of the IATA ADRM states that 10 minutes is the maximum wait time for passengers at the SSCP to achieve an Optimum LOS.

The analysis assumed the passenger screening to be 140 passengers per hour per lane. The passenger processing rate represents the industry standard planning factor TSA uses to plan facility enhancements.

The results of the passenger screening checkpoint are described in **Table 4-16**. The analysis determined the number of screening lanes required to achieve a maximum wait time of 10 minutes for passengers. The analysis shows that 11 screening lanes are required to meet the maximum wait time requirement. The analysis assumed that the queuing area would be 600 square feet per checkpoint lane and the inspection area is 1,250 square feet per checkpoint lane. The results show that the existing SSCP is insufficiently sized to accommodate the Base PAL demand.

Table 4-16
South Terminal Passenger Screening Checkpoint Area Requirements

	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
Lane Requirements					
Lanes	6	7	9	10	11
Max Number of People in Queue (10-minute Wait)	-	144	189	212	235
Area Requirements					
Queuing Area (SF)	2,820	4,200	5,400	6,000	6,600
Inspection Area (SF)	7,450	8,750	11,250	12,500	13,750
SSCP Administrative Area (SF)	510	870	1,100	1,200	1,340
Total Security Screening Checkpoint Area (SF)	10,780	13,820	17,750	19,700	21,690
Surplus / (Deficit)	-	(3,040)	(6,970)	(8,920)	(10,910)

Source: RS&H Analysis, 2024
Note: Red font color indicates standard not met. SF = square feet.

4.5.2.3 Outbound Baggage Screening

The requirements for outbound baggage screening represent the space required to accommodate the baggage screening process that is completed by the Transportation Security Administration (TSA). TSA undertook a recapitalization effort in 2017 with the goal of optimizing the outbound baggage screening equipment in the South Terminal. This included replacing the explosive detection systems (EDS) equipment with newer equipment to achieve a faster and more reliable baggage screening system. The basis of design for the upgraded system is to achieve a total outbound baggage screening rate of 1,348 bags per hour. However, there were

some initial challenges achieving that throughout rate. Initial testing yielded a throughput rate of 1,164 bags per hour for the entire system according to the *2018 ANC South Terminal Expansion Study*.

The requirements analysis completed as part of this Master Plan Update was prepared using analysis inputs referenced in the *2018 ANC South Terminal Expansion Study* and supplemented by industry standard metrics for baggage screening. The analysis also considered the number of originating passengers departing during the peak hour during the design day and assuming a rate of one checked bag per passenger. The analysis results are described in **Table 4-17**. The results demonstrate that the existing outbound baggage screening area is sufficient to accommodate the demand throughout the planning period.

Table 4-17
South Terminal Baggage Screening Area Requirements

	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
Baggage Screening Area					
Peak Hour Checked Baggage	-	800	800	900	1,000
Odd-sized / Large bags requiting ETD inspections	-	24	25	26	30
Total bags to process through Level 1 EDS Units	-	800	800	800	1,000
Level 1 Baggage Screening	-				
Level 1- Explosive Detection System Units	-	4	6	6	6
Checked Baggage Inspection System	-	6,400	9,600	9,600	9,600
Level 2 Baggage Screening	-				
Level 2- On-Screen Resolution Area (SF)	-	300	400	400	400
Baggage Encoding Station Area (SF)	-	3,600	3,600	3,600	3,600
EDS Maintenance / Storage Area (SF)	-	400	400	400	400
Area Subtotal (SF)	-	10,700	14,000	14,000	14,000
Level 3 Baggage Screening	-				
Level 3- Explosive Trace Detection Units	-	4	5	5	6
Checked Baggage Resolution Area (SF)	-	1,400	1,400	1,400	1,700
TSA Staff Support Area (SF)	-	2,700	2,800	2,900	3,400
Area Subtotal (SF)	-	4,100	4,200	4,300	5,100
Baggage Inspection Support Facilities	-				
Conveyor Control Room and IT Area (SF)	-	400	400	400	500
Conveyor Maintenance and Storage Area (SF)	-	700	700	700	800
Area Subtotal (SF)	-	1,100	1,100	1,100	1,300
Total Baggage Screening Area (SF)	24,000	15,900	19,300	19,400	20,400
Administration and Support Offices					
TSA Agent Breakroom (SF)	-	1,900	1,900	1,900	2,600
Training Room (SF)	-	500	500	500	600
Storage Room (SF)	-	200	200	200	300
Total Administration Area (SF)	600	2,600	2,600	2,600	3,500
Total Baggage Screening Area					
Total Baggage Handling Area (SF)	24,600	18,500	21,900	22,000	23,900
Surplus/(Deficit) (SF)	-	6,100	2,700	2,600	700

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. SF = square feet.

4.5.2.4 Outbound Baggage Make-up

The outbound baggage make-up area is where airline personnel assemble checked baggage for outbound flights after the baggage has been screened by TSA. The outbound baggage make-up analysis was calculated in consideration of the aircraft fleet by using the equivalent aircraft

methodology. Industry standard planning factors for the number of staged baggage carts per equivalent aircraft, staging and make-up unit area per baggage cart, and baggage cart circulation area were used.

The analysis calculates the number of baggage carts/containers required for the outbound baggage operation during the peak hour based on the forecast number of outbound seats during the peak hour. An industry standard planning factor of 600 square feet per cart/container is applied to determine the make-up and offloading area. An additional 15% factor is added to account for the baggage train circulation and bypass area. The analysis results show that the existing outbound baggage make-up area is insufficiently sized to accommodate the Base PAL and future PALs. Additional space is recommended to allow a more efficient outbound baggage handling operation. The analysis results are described in **Table 4-18**.

Table 4-18
South Terminal Outbound Baggage Make-up Area Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Baggage Carts/Containers	-	53	55	57	68
Baggage Make-Up and Offloading Area (sf)	-	31,800	33,000	34,200	40,800
Baggage Train Circulation and Bypass Area (sf)	-	4,800	5,000	5,100	6,100
Total Baggage Make-up Area (sf)	31,800	36,600	38,000	39,300	46,900
Surplus/(Deficit) (sf)	-	(4,800)	(6,200)	(7,500)	(15,100)

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. sf = square feet.

4.5.2.5 Inbound Baggage Handling

The inbound baggage handling system includes the offloading area where inbound checked bags are offloaded from the carts/containers, transferred to the induction belt conveyer system, and delivered to passengers in the baggage claim area. The facility requirements analysis was completed for the inbound baggage service area and baggage claim area. The analysis results are described in **Table 4-19**.

Offload frontage is calculated based on the estimated number of carts/containers expected to perform the offload baggage operation during the peak hour. Calculation of the offload area assumes that a depth of 13 feet is sufficient for a tug with carts/containers to park adjacent to the offload belt with enough space for personnel to transfer bags to the induction belt. The bypass area is calculated assuming a tug lane 10 feet wide is sufficient for circulation. The results indicate that the existing inbound baggage service area is insufficient to accommodate the Base PAL demand. The facility deficit increases throughout the planning period.

The analysis of the baggage claim area is based on the estimated number of terminating passengers that checked baggage. The baggage claim requirement is determined based on the planning factor of each passenger requiring 2.4 feet of space along the baggage claim device to retrieve their bag. This is based on the typical inbound baggage operation where passengers arrive in the baggage claim lobby prior to their bags. Typical passenger behavior is for one member of the travel party to stage adjacent to the baggage claim belt with others dwell in the lobby but not adjacent to the belt. The requirements analysis results show that the existing baggage claim lobby is sufficient to accommodate the forecast demand throughout the planning period.

Table 4-19
South Terminal Baggage Claim and Inbound Baggage Service Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Inbound Baggage Service Area					
Offload Belt Frontage (lf)	380	390	390	400	450
Off-Load Belt Frontage Surplus/(Deficit) (lf)	-	(10)	(10)	(20)	(70)
Off-Loading Area (sf)	-	5,100	5,100	5,200	5,800
Tug By-Pass and Service (sf)	-	3,900	3,900	4,000	4,500
Area Subtotal (sf)	8,400	9,000	9,000	9,200	10,300
Area Subtotal Surplus/(Deficit) (sf)	-	(600)	(600)	(800)	(1,900)
Baggage Claim Lobby					
Claim Belt Frontage (lf)	570	780	780	800	900
Claim Belt Frontage Surplus/(Deficit) (lf)	-	(210)	(210)	(230)	(330)
Baggage Claim Device Area (sf)	-	14,600	14,600	15,000	16,800
Active Area & Passenger Access (sf)	-	11,600	11,600	12,000	13,500
Lost Bag Services (sf)	-	2,600	2,600	2,700	3,000
Area Subtotal (sf)	35,300	28,800	28,800	29,700	33,300
Area Subtotal Surplus/(Deficit) (sf)	-	6,500	6,500	5,600	2,000

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. lf = linear feet. sf = square feet.

4.5.2.6 Holdrooms

The facility requirements analysis for the holdrooms based on analysis of peak hour departures for each aircraft type. The analysis considered industry standard planning factors as described in ACRP Report 25, *Airport Passenger Terminal Planning and Design*, including the split of seated vs standing passengers and the areas associated with each functional area within the holdroom area.

The analysis assumed that 85% of passengers are sitting and the remaining 15% of passengers are standing. It also assumed that each seated person would need 15 square feet while each standing person would need 10 square feet.

The analysis assumed that a typical single-position gate podium is 5 feet wide. The depth of the counter and area behind the counter is typically 8 feet deep. A 15-foot-deep area in front of the counter is allocated to allow for queuing. These planning factors were confirmed and set based on actual departure lounge dimensions and check-in counter placement at the Airport.

The deplaning / enplaning hall is the circulation space within the departure lounge used to access the passenger boarding bridge and is planned at 350 square feet per gate based on existing deplaning / enplaning hall space utilization. Overall circulation and structural space are considered 10% and 2%, respectively, of the combined departure lounge, departure check-in counter, and deplaning / enplaning hall area.

The South Terminal holdroom requirements are described in **Table 4-20**. The results show that the existing holdroom space is sufficient, in aggregate, to accommodate the Base PAL. Additional holdroom space is required to accommodate the demand starting in PAL 1. That deficit continues throughout the planning period.

Table 4-20
South Terminal Holdroom Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Passenger Lounge Area					
Departure Lounge Seating Area (sf)	-	30,200	33,000	39,300	51,000
Departure Lounge Standing Area (sf)	-	8,600	9,400	11,200	14,600
Area Subtotal (sf)	-	38,800	42,400	50,500	65,600
Gate Counter Area					
Gate Check-In Counter Area (sf)	-	1,100	1,200	1,300	1,600
Gate Check-In Queuing Area (sf)	-	2,700	3,100	3,300	3,900
Area Subtotal (sf)	-	3,800	4,300	4,600	5,500
Support Space					
Deplaning/Enplaning Hall (sf)	-	4,600	5,400	5,700	6,800
Allowance for Amenities (sf)	-	2,600	2,800	3,300	4,200
Area Subtotal (sf)	-	7,200	8,200	9,000	11,000
Total Holdroom Area					
Total Holdroom Area (sf)	51,300	49,800	54,900	64,100	82,100
Area Surplus/(Deficit) (sf)	-	1,500	(3,600)	(12,800)	(30,800)

Source: RS&H Analysis, 2024
Notes: Red font color indicates standard not met. sf = square feet.

4.6 Ground Access Capacity and Requirements

Ground access capacity and requirements (also referred to as landside facility requirements) were determined for the airport access and terminal roadways, terminal curbside, commercial vehicle staging areas, employee and public parking facilities, and rental car facilities.

4.6.1 Airport Access and Terminal Roadways

Roadway requirements are determined by assessing the vehicle traffic volume demand against the capacity of the roadways serving the Airport during peak hour of an average day during the peak month of demand. The volume / capacity ratio serves as the ratio to determine how effective a road is able to facilitate the flow of traffic, or how likely it is to cause congestion.

Once a roadway falls beyond a certain Level of Service and traffic has been deemed poor or failed, then roadways improvements are typically required to alleviate roadway congestion to reestablish the orderly flow of traffic. Industry standard for roadway Level of Service is shown in **Table 4-21**, depicting Levels A through F. Level C, stable traffic flows with moderate volume, represent the industry target for airport roadway Level of Service.

Table 4-21
Level of Service Definitions for Roadways

Level of Service Rating	Description	Typical Volume / Capacity Ratio
A	Free-flow conditions with unimpeded maneuverability. Minor disruptions to flow are easily absorbed.	0.00 to 0.26
B	Reasonably unimpeded operations with slightly restricted maneuverability. Minor disruptions are still easily absorbed, although local deterioration in LOS is more obvious.	0.27 to 0.41
C	Stable operations with somewhat more restrictive operations. Minor disruptions can cause serious local deterioration in service.	0.42 to 0.59
D	Approaching unstable operations where small increases in volume produce substantial increases in delay and decreases in speed.	0.60 to 0.81
E	Operations at or near capacity. Disruptions cannot be dissipated readily, often causing queues to form.	0.82 to 1.00
F	Forced or breakdown in flow. Operations within queues are highly unstable, motorists experience brief periods of movement followed by stoppages.	Greater than 1.00

Source: InterVISTAS Consulting *Terminal Ground Access Study,* 2019; Transportation Research Board *Highway Capacity Manual 2010.*

To determine the level of service for airport roadways, specifically the Airport loop servicing the South Terminal, data from the InterVISTAS Consulting *Terminal Ground Access Study* and

Municipality of Anchorage *2022 Annual Traffic Volume Report* were used to determine traffic levels. This information was then compared to the forecast passenger growth rate. The resulting traffic volume for the Airport loop, gathered in 2019 from data obtained by AKDOT&PF, Kittleson, and InterVISTAS Consulting, is depicted in **Table 4-22**.

4.6.2 Airport Access Circulation Roadways

Forecasts of future terminal area roadway traffic volumes were prepared using data obtained from Alaska Department of Transportation and Public Facilities (AKDOT&PF) and surveys conducted in August 2019 as part of this study. It was assumed that roadway traffic volumes will increase at the same rate as airline passengers who are originating or terminating at ANC—commonly referred to as O&D airline passengers. Roadway traffic volumes were compared to the calculated capacities of the critical segments of the existing roadway network. Based upon the ratio of the roadway volumes and capacities, existing, 2025, 2030, and 2035 Levels of Service (LOS) were determined for these roadway segments. The critical terminal area roadway segments and the LOS on these segments are depicted in **Figure 4-22**.

Figure 4-22
August 2019 Design Hour Level of Service on Key ANC Roadway Links

Source: InterVISTAS Consulting *Terminal Ground Access Study,* 2019.

All roadway segments are expected to operate at an acceptable level of service (LOS C or better) through 2035. The terminal has an upper-level Departures roadway, and a lower-level, Arrivals inner roadway (reserved for private vehicles) and outer curbside roadway (reserved for

commercial vehicles). The LOS of the terminal curbside areas was determined based upon August 2019 surveys of peak hour traffic volumes, vehicle classifications, and vehicle dwell times. Analyses indicate that the Departures curbside and outer Arrivals curbside now operate at LOS B or better during the peak hour, but that the inner Arrivals curbside operates at LOS D due to long vehicle dwell times. This Level of Service was escalated over the planning period to match the increase of originating and departing (O&D) passengers. This analysis is expanded on in **Table 4-23**.

Table 4-22
Level of Service by Roadway Links in 2019

Link	Roadway Classification	Location	Speed (MPH)	# of Lanes	LOS C Capacity	2019 Peak Hour Volume	LOS
A	Entry/Exit Roadway	Airport Entrance	35	2	1,580	1,210	B
B	Terminal Access Roadway	Airport Entrance after Recirculation	35	3	2,370	1,221	A
C	Terminal Access Roadway	Airport Entrance after Parking and Rental Car	35	5	3,950	937	A
D	Terminal Access Roadway	Airport Entrance after Hold Lot	20	4	2,400	875	A
E	Terminal Access Roadway	Arrivals Split	20	2	1,200	448	A
F	Terminal Access Roadway	Departures Split	20	2	1,200	427	A
G	Terminal Access Roadway	Arrivals Inner Curb (PVs)	20	3	1,800	395	A
H	Terminal Access Roadway	Arrivals Outer Curb (CVs)	20	1	600	52	A
HA	Terminal Access Roadway	Arrivals Outer Curb (CVs) after Hold Lot Merge	20	4	2,400	299	A
I	Terminal Access Roadway	Arrivals Inner Curb Exit	20	1	600	395	A
J	Terminal Access Roadway	Departures Exit	20	1	600	427	B
K	Terminal Access Roadway	Arrivals Outer Curb Exit	20	1	600	299	A
L	Terminal Access Roadway	Airport Exit before Parking Exit	20	3	1,800	1,121	A
M	Terminal Access Roadway	Airport Exit before Recirculation	35	3	2,370	922	A
N	Entry/Exit Roadway	Airport Exit after Recirculation	35	2	1,580	1,110	B
O	Ramp	Recirculation	15	1	600	11	A
P	Terminal Access Roadway	Hold Lot	20	1	600	63	A
Q	Terminal Access Roadway	Rental Car	20	1	600	184	A
R	Terminal Access Roadway	Parking	20	1	600	100	A

Source: InterVISTAS Consulting, *Terminal Ground Access Study* 2019; InterVISTAS Consulting, October 2019 based upon traffic surveys conducted by Kittleson & Associates, August 2019 and AKDOT surveys. Level of Service calculated based upon Airport Cooperative Research Program (ACRP) Report 40 - Terminal Area and Curbside Roadway Operations.

Table 4-23
Level of Service by Roadway Links by PALs

Link Designation	Roadway Classification	Location	LOS C Capacity	Demand			
				Base	PAL 1	PAL 2	PAL 3
A	Entry/Exit Roadway	Airport Entrance	1,580	1,210	1,428	1,589	1,914
B	Terminal Access Roadway	Airport Entrance after Recirculation	2,370	1,221	1,441	1,604	1,931
C	Terminal Access Roadway	Airport Entrance after Parking and Rental Car	3,950	937	1,105	1,231	1,482
D	Terminal Access Roadway	Airport Entrance after Hold Lot	2,400	875	1,032	1,149	1,384
E	Terminal Access Roadway	Arrivals Split	1,200	448	529	588	709
F	Terminal Access Roadway	Departures Split	1,200	427	504	561	675
G	Terminal Access Roadway	Arrivals Inner Curb (PVs)	1,800	395	466	519	625
H	Terminal Access Roadway	Arrivals Outer Curb (CVs)	600	52	61	68	82
HA	Terminal Access Roadway	Arrivals Outer Curb (CVs) after Hold Lot Merge	2,400	299	353	393	473
I	Terminal Access Roadway	Arrivals Inner Curb Exit	600	395	466	519	625
J	Terminal Access Roadway	Departures Exit	600	427	504	561	675
K	Terminal Access Roadway	Arrivals Outer Curb Exit	600	299	353	393	473
L	Terminal Access Roadway	Airport Exit before Parking Exit	1,800	1,121	1,323	1,472	1,773
M	Terminal Access Roadway	Airport Exit before Recirculation	2,370	922	1,088	1,211	1,458
N	Entry/Exit Roadway	Airport Exit after Recirculation	1,580	1,110	1,310	1,458	1,756
O	Ramp	Recirculation	600	11	13	14	17
P	Terminal Access Roadway	Hold Lot	600	63	74	83	100
Q	Terminal Access Roadway	Rental Car	600	184	217	242	291
R	Terminal Access Roadway	Parking	600	100	118	131	158

Source: RS&H Analysis, 2024; InterVISTAS Consulting, Terminal Ground Access Study 2019; InterVISTAS Consulting, October 2019 based upon traffic surveys conducted by Kittleson & Associates, August 2019 and AKDOT surveys. Level of Service calculated based upon Airport Cooperative Research Program (ACRP) Report 40 - Terminal Area and Curbside Roadway Operations.
Note: Red font color indicates standard not met.

Many of the roads in the Airport loop will remain at LOS C or better through the planning period, however; the airport entrance, arrivals inner curb, departures exit, and airport exit after recirculation will have a peak volume demand above capacity of LOS C. These areas will become congested in their current condition unless traffic is rerouted or roadway infrastructure is modified, such as adding lanes.

4.6.3 Terminal Curbside / Commercial Vehicle Staging

Terminal curb length requirements in linear feet were determined for the terminals, with focus on the South Terminal. Curb length requirements are based on existing curbside infrastructure, passenger characteristics, and patterns of the vehicles that use the terminal curbside. Curbside requirements were determined by applying standard passenger and vehicular characteristics, supplemented with Airport staff interviews. Curb length requirements were also determined based on originating and terminating passenger volumes and their forecast through the planning horizon.

4.6.3.1 South Terminal

The South Terminal curbside consists of two areas, the upper level and lower level. The upper level is departure level, and issued for and is used for dropping off passengers by private vehicles, commercial vehicles, tour vehicles, shuttles, public buses, and charter buses.

The upper-level curb measures 950 feet long. There are four lanes, two curb lane for drop off, one lane used for vehicle maneuvering, and two bypass lanes. The lower-level inner curb is used for picking up arriving passengers by private vehicles. The curb is 825 feet long with three lanes, one lane is used for passenger pick up, one lane is used for vehicle maneuvering, and one lane is used for bypass. The lower-level outer curb, also known as the commercial vehicle curb, is used primarily for picking up passengers by commercial vehicles but is used by other vehicles such as the People Mover bus and charter busses. The curb is 1,080 feet long with four lanes, one curb is used for picking up and drop off of passengers, one lane is used for vehicle maneuvering, and the other two lanes are bypass lanes. Rental vehicles are routed into this curb, so add additional demand volume as these users utilize this roadway.

Each vehicle was assigned a standard stall length as part of the analysis using industry standard measurements, expanded in further detail in **Table 4-24**.

Dwell times, or the amount of time a vehicle takes at a curb to wait for passengers, load passengers and luggage, and unload passengers and luggage, is also important to this analysis. It has been noted that observed private vehicle dwell times at ANC exceed typical dwell times at other airports in the United States. Average private vehicle dwell times at ANC are approximately 3 minutes for departures and 6 minutes and ten seconds for arrivals, and typical

airport dwell times are approximately 1 minute and 30 seconds for arrivals and two minutes for departures.

Table 4-24
Vehicle Characteristics by Level and Curb Area

	Standard Stall Length (Feet)
Upper Departures Level	
Private Vehicle Drop-off	25
Commercial Vehicle Drop-off	30
Tour / Charter Bus Drop-off	60
Lower Arrivals Level - Inner Curb Area	
Private Vehicle Pick-up	25
Lower Arrivals Level - Outer Curb Area	
Taxi Staging	25
Taxi Pick-up	25
Permitted Courtesy Van, Off-Airport Shuttle, Limos	30
Airport Shuttle Drop-off / Pick Up	35
People Mover Bus Drop-off / Pickup	60
Tour / Charter Bus Pick-up	60

Source: Airport Cooperative Research Program, Report 40 *Airport Curbside and Terminal Area Operations*.

Terminal interface LOS is defined through a scale of Level A-F, whereas Level A is preferable, and Level F is a capacity failure. Level C, stable traffic flows with moderate volume, represents the industry target for airport roadway Level of Service. **Figure 4-23** depicts how terminal curb LOS and what results for terminal curb roadway demand volume and capacity under that LOS.

Information about vehicle usage, characteristics, and curb utilization is necessary to determine terminal curb length requirements. The scenario is based off of the peak hour of an average day of the peak month (July) of demand volume. These volumes were taken from roadside observations, interviews with Airport personnel and tenants, and input from other users. This data was initially compiled by the InterVISTAS Consulting for the *Terminal Ground Access Study*. This data was escalated over the forecast passenger growth over the planning period to account for traffic growth. LOS is determined using the Quick Analysis Tool for Airport Roadways (QATAR), and depicts the current and forecast LOS for the upper-deck departure curb **(Figure 4-24**), the lower-deck arrival outer curb for commercial operators such as taxis, busses, rideshare vehicles, and shuttles (**Figure 4-25**), and the lower-deck arrival inner curb for non-commercial vehicles **Figure 4-26**).

Figure 4-23
Terminal Curb Level of Service

Drivers experience no interference from other vehicles or pedestrians. Motorists arriving at the airport terminal can stop adjacent to the curb at preferred locations. Demand is equal to or less than 0.50 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is unaffected.

Relatively free-flow conditions, although double-parking can be observed at some curbside locations (i.e., baggage check-in, major entrance/exit points). Demand is between 0.5 and 0.55 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is virtually unaffected.

Double-parking near doors is common and some intermittent triple-parking may occur. This level of service is appropriate for peak period design conditions at major airports. Demand is between 0.55 and 0.65 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by approximately 5% due to the increased frequency of double-parking.

Triple-parking occurs more frequently and vehicle maneuverability is somewhat restricted. Intermittent vehicle queues may form both in the through lanes and at the entrance to the curbside area. Demand is between 0.65 and 0.85 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by over 20% due to the increased frequency of double- and triple-parking.

LOS E—Motorists experience delays and queues along the length of the curbside. Both congestion and double- or triple-parking are evident throughout the curbside area. Momentary breakdowns in operation occur as traffic in the through lanes is increasingly delayed by vehicle maneuvering in and out of the parking lanes. Demand is between 0.85 and 1.0 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by over 35% due to the increased frequency of double- and triple-parking.

LOS F—Motorists experience significant delays at the curbside entrance and along the length of the curbside. Parked vehicles are unable to leave the curbside due to stopped vehicles in adjacent lanes. Demand exceeds 1.0 of the double-parking capacity of the curbside. The flow of vehicles in all lanes frequently comes to a halt.

Drivers experience no interference from other vehicles or pedestrians. Motorists arriving at the airport terminal can stop adjacent to the curb at preferred locations. Demand is equal to or less than 0.50 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is unaffected.

Relatively free-flow conditions, although double-parking can be observed at some curbside locations (i.e., baggage check-in, major entrance/exit points). Demand is between 0.5 and 0.55 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is virtually unaffected.

Double-parking near doors is common and some intermittent triple-parking may occur. This level of service is appropriate for peak period design conditions at major airports. Demand is between 0.55 and 0.65 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by approximately 5% due to the increased frequency of double-parking.

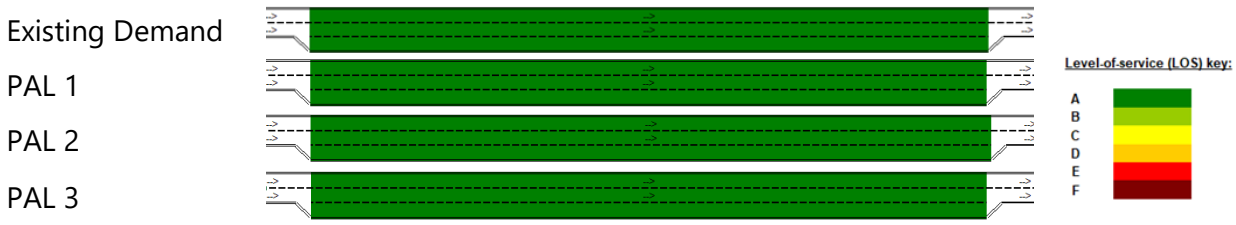
Triple-parking occurs more frequently and vehicle maneuverability is somewhat restricted. Intermittent vehicle queues may form both in the through lanes and at the entrance to the curbside area. Demand is between 0.65 and 0.85 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by over 20% due to the increased frequency of double- and triple-parking.

LOS E/F
LOS E—Motorists experience delays and queues along the length of the curbside. Both congestion and double- or triple-parking are evident throughout the curbside area. Momentary breakdowns in operation occur as traffic in the through lanes is increasingly delayed by vehicle maneuvering in and out of the parking lanes. Demand is between 0.85 and 1.0 of the double-parking capacity of the curbside. Capacity of adjacent through lanes is reduced by over 35% due to the increased frequency of double- and triple-parking.
LOS F—Motorists experience significant delays at the curbside entrance and along the length of the curbside. Parked vehicles are unable to leave the curbside due to stopped vehicles in adjacent lanes. Demand exceeds 1.0 of the double-parking capacity of the curbside. The flow of vehicles in all lanes frequently comes to a halt.

Source: Airport Cooperative Research Program, Report 40 *Airport Curbside and terminal Area* Operations; InterVISTAS Consulting *Terminal Ground Access Study,* 2019.

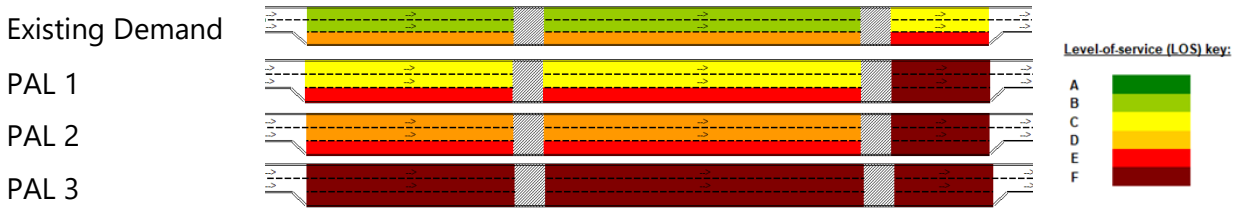
Terminal curb LOS will be adequate through the planning period for the upper deck departure curb and the lower deck outer arrival curb, maintaining LOS Level A. The lower deck inner arrival curb has existing capacity ranging between LOS Level B and Level E, and future passenger demand growth will continue to degrade this LOS. By PAL 1, the first segment of the curb will be in LOS Level F, and by PAL 3 the entire curb and roadway network will be in LOS Level F.

Figure 4-24
Terminal Departure Curb Level of Service



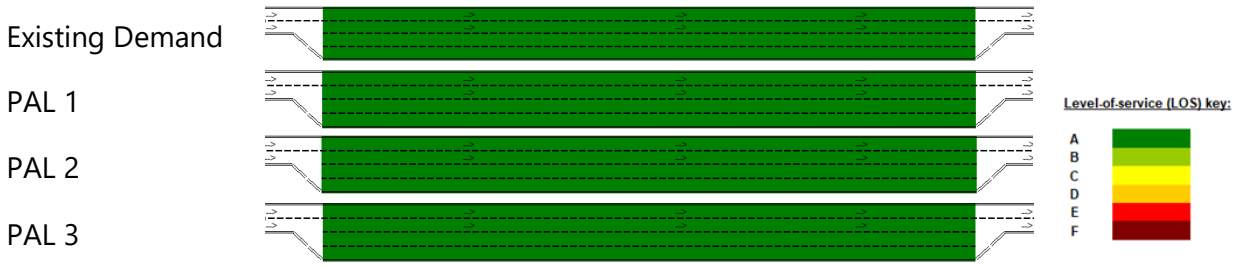
Source: InterVISTAS Consulting *Terminal Ground Access Study,* 2019; Quick Analysis Tool for Airport Roadways (QATAR), DOWL; Airport Cooperative Research Plan, Report 40 *Airport Curbside and Terminal Area Operations*, 2010.

Figure 4-25
Terminal Inner Arrival Curb Level of Service



Source: InterVISTAS Consulting *Terminal Ground Access Study,* 2019; Quick Analysis Tool for Airport Roadways (QATAR), DOWL; Airport Cooperative Research Plan, Report 40 *Airport Curbside and Terminal Area Operations*, 2010.

Figure 4-26
Terminal Outer Arrival Curb Level of Service



Source: InterVISTAS Consulting *Terminal Ground Access Study,* 2019; Quick Analysis Tool for Airport Roadways (QATAR), DOWL; Airport Cooperative Research Plan, Report 40 *Airport Curbside and Terminal Area Operations*, 2010.

4.6.3.2 North Terminal

The North Terminal curbside exists solely on a single level, split into an inner and outer curb area. The inner curb area is approximately 200 feet long and is used primarily by private vehicles for arriving and departing passengers. Shuttle vehicles, limousines, charter buses, and taxis with a length of less than 28 feet are permitted to drop off and pick up passengers in this area as well. The outer curb is meant for vehicles over 28 feet that are dropping and picking up passengers, including the public People Mover bus. Finally, the north and south of the inner curb serve as another curb area used by airport shuttles and charter buses to drop off and pick up passengers.

Due to the North Terminal's low traffic volume, the curbside area and roadways maintain a high LOS and are not forecast to degrade in service over the planning period. This assumes that the use of the North Terminal does not change notably from the current and forecast configuration.

4.6.3.3 Commercial Vehicle Staging

Taxis and charter buses, referred to as commercial vehicles for this analysis, underwent staging requirements by extrapolating the curbside analysis demand to overflow staging areas. Vehicle staging comprises of the following areas –

- Taxi staging area (with space for 70 vehicles) located just east of the Airport Traffic Control tower
- Charter bus staging area (nine stalls) adjacent to the C Concourse and loading dock
- Charter bus staging area (three stalls) near the north end of the North Terminal

Requirements for these overflow areas were determined by assessing the curbside capacity results and identifying where demand exceeded supply during the peak hour of the average day of the peak month. It was assumed that curbside and staging areas would remain the same during the planning period for this analysis. Through this analysis, as well as user and Airport staff input, the current facilities provide the capacity required through the planning period.

4.6.4 Parking

4.6.4.1 Public Parking

Public parking stall and acreage requirements were determined based on multiple factors, including daily parking transactions during the peak month, parking occupancy rates, the duration of vehicle stay in each lot. Hourly and daily parking data analysis was extrapolated with forecast growth of originating passenger. This data can be found in **Table 4-25**.

Public parking stall requirements were determined using hourly and daily transaction data, the average parking duration, and a set of standard time surge factors. To estimate the hourly public parking demand, a surge factor of 1.4 for increased volumes during peak and a 1.1 search factor when vehicles are spending time to search for parking spaces during peak times was applied. For daily parking requirements, a surge factor of 1.05 and a search factor of 1.1 were used.

Parking demand at ANC exceeds the existing supply, and this deficit is forecast to increase over the forecast period. By PAL 3, parking will be in a deficit of approximately 58%. There are off-site, non-airport parking options such as Diamond Airport Parking and Alaska Parking; however, they are typically at or near capacity as well. This information can be found in **Table 4-26**.

Table 4-25
Public Parking Daily Parking Transactions

Parking Area		Average Parking Duration
ST Short-Term Parking Garage	Hourly	1.45
	Daily	4.26
ST Long-Term Parking Lot	Hourly	3.21
	Daily	6.66
NT Short-Term Parking Lot	Hourly	1.48
	Daily	4.22
Park, Ride & Fly Parking Lot	Hourly	3.20
	Daily	14.91

Source: RS&H Analysis, 2024; Republic Parking, 2023.

Table 4-26
Public Parking Space Requirements

Parking Area	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
ST Short-Term Parking Garage	1,235	1,095	1,295	1,440	1,710
ST Long-Term Parking Lot	895	1,230	1,450	1,615	1,935
NT Short-Term Parking Lot	210	40	50	55	65

Park, Ride & Fly Parking Lot (Economy)	290	370	435	485	585
Total Public Parking	2,630	2,735	3,230	3,595	4,295
Surplus/(Deficit)	-	(105)	(600)	(965)	(1,665)

Source: RS&H Analysis, 2024; Republic Parking, 2023.
Note: Red font color indicates standard not met.

4.6.4.2 Employee Parking

Parking for employees of the Airport were determined through a set of tailored factors. If the employee's work function is more related to passenger growth, then passenger enplanement was used as the forecast guidance. If the employee's work function had more to do with aircraft servicing or operations, then aircraft operations growth was used as the forecast guidance. Existing parking lot use was determined through Airport staff and employees and through observation.

Towards the end of the planning period, there will be a deficit in available employee parking spaces, notably in the South Terminal Employee Lot D and Airport Offices lot. Additional facilities will need to be introduced in order to supply the total amount of parking needed. This is presented in **Table 4-27**.

Table 4-27
Employee Parking Space Requirements

Parking Area	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
North Terminal Employee Lot A	170	85	90	100	120
North Terminal Employee Lot C	75	45	55	60	70
South Terminal Employee Lot D	895	820	955	1,055	1,265
Airport Admin Offices Lot (Concourse Connector)	20	20	20	25	30
Total Employee Parking	1,160	970	1,120	1,240	1,485
Surplus/(Deficit)	-	190	40	(80)	(325)

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met.

4.7 Air Cargo Capacity and Requirements

Cargo facility requirements at ANC were determined for buildings, aprons, and landside areas based on forecast cargo growth. Cargo at ANC is classified into three categories: international cargo, intrastate cargo, and other domestic cargo. Each category has distinct needs and requirements.

International cargo represents cargo with an origin or destination in another country. This category of cargo accounts for approximately 2.45 million tons of cargo volume at ANC in 2022. This represented 68% of the total cargo volume at ANC in 2022. Approximately 39% of the 2.45 million tons of international cargo volume was sorted in cargo buildings at ANC while 61% of the cargo volume transited through the ANC without being sorted.

Intrastate cargo represents cargo traffic with an origin and destination within the state of Alaska. Intrastate cargo carriers use a diverse fleet of aircraft types to provide essential goods to small and remote communities. This category of cargo accounted for approximately 120,000 tons of cargo volume at ANC in 2022. This represented 3% of the total cargo volume at ANC in 2022. All of the 120,000 tons of intrastate cargo volume was sorted in cargo buildings at ANC.

Other domestic cargo represents cargo where both the origin and destination within the United States but with an origin or destination outside of the state of Alaska. This includes operations originating or terminated in cargo hubs within the Lower 48 States shipping cargo that originates or terminates in ANC. This category of cargo accounted for approximately 1.02 million tons of cargo volume at ANC in 2022. This represented 29% of the total cargo volume at ANC in 2022. Approximately 87% of the 1.02 million tons of the other domestic cargo volume was sorted in cargo buildings at ANC while 13% of the cargo volume transited through the ANC without being sorted.

4.7.1 Cargo Buildings

Cargo buildings at ANC are located primarily in the North Airpark and East Airpark. Future cargo building space requirements were determined for regional, other domestic, and international cargo activity to ensure proper space for cargo loading, unloading, sorting, and to provide proper support space for these operations.

A warehouse area productivity utilization rate was determined by analyzing the utilization rate for cargo buildings to develop facility requirements for cargo buildings at ANC. This utilization rate is based on what cargo category it services (intrastate, other domestic, international) and the volume of each type of cargo the facility services annually. The utilization rate is determined by calculating the ratio of cargo building area per annual ton of cargo processed for each cargo category. Utilization rates are usually expressed as a "square foot per annual ton" metric. This

rate is typically between 1.0 and 2.5 in the US; however, ANC's unique cargo operations allow for a higher utilization, meaning a smaller utilization number results. Cargo facilities should aim to be close to their target utilization rate; the facility has excess capacity when the utilization number is higher than target and does not have enough capacity when the utilization rate number is smaller than target. Each category of cargo requires different utilization rates due to the nature of their distinct operations requirements, with intrastate facilities needing a higher square foot per ton of cargo utilization ratio number than other-domestic and international cargo facilities.

In-transit cargo is not included in this analysis. In-transit cargo is typically cargo that remains on an aircraft during servicing on tech stops, or cargo that remains in its Unit Load Device (ULD) and is moved from one plane to another on the apron without sorting the cargo inside the container. Only enplaned and deplaned cargo is used for this analysis, as they are the only portions of cargo that require cargo facilities.

ANC is highly specialized for efficient cargo sorting and transfer. ANC is a cargo hub for the integrated carriers FedEx and UPS and hosts a high volume of service between Asian countries and the Lower 48 States. Since the previous Master Plan Update, these carriers have added facility capacity to keep up with demand for cargo throughout the world. Over the COVID-19 pandemic, e-commerce and other shipping increased substantially; however, cargo volume at ANC has decreased slightly from the COVID-19 pandemic peak and has now normalized.

The cargo building utilization rates will continue to indicate that the buildings are undersized as the cargo volume increases throughout the planning period unless facilities are expanded. Utilization rates should be maintained at an efficient level to prevent overdevelopment or underdevelopment. As more cargo volume is processed at ANC, more building space will be needed to maintain an efficient utilization rate.

4.7.1.1 Intrastate Cargo Buildings

ANC has approximately 310,000 SF of dedicated Intra-Alaska cargo facilities. Intrastate cargo aircraft have longer sit and load times and use smaller aircraft than the international freight airlines. Intrastate cargo generates more aircraft operations per ton of cargo than the other cargo categories. Cargo carriers such as Alaska Airlines Cargo, Northern Air Cargo, and Lynden Air Cargo serve the intrastate market at ANC.

A higher ratio of square foot to ton is needed due to the nature of cargo for intrastate commerce. This is due to cargo being less dense manufactured goods, residential consumer goods, and less-than-pallet goods that take more space to assemble payloads, load, and occupy more space inside the aircraft for less payload than other categories. This is translated into

methodology by a utilization ratio of 1.5 square feet / ton of cargo being goal for cargo processing areas, and 0.25 square feet / ton of cargo being needed in addition for administrative and support spaces.

The facility requirements analysis for intrastate cargo buildings determined that the needs for current and forecast conditions through the planning period are met.

4.7.1.2 Other Domestic and International Cargo Buildings

Most domestic and international cargo is processed by UPS or FedEx. Many areas for non-intrastate domestic and international cargo share processing space; however, for this analysis, non-intrastate domestic space occupies approximately 182,000 square feet and international building space occupies approximately 718,000 square feet. This is translated into methodology by a utilization ratio of 0.5 square feet / ton of cargo being goal for cargo processing areas, and 0.125 square feet / ton of cargo being needed in addition for administrative and support spaces.

There is currently an approximate 250,000 SF or 28% deficit in other-domestic and international cargo building space. This is due in part to the increase of international cargo with e-commerce. This deficit will increase to approximately 865,000 SF, or nearly 97% by the end of the planning horizon. More cargo building space will need to be provided in order to maintain an adequate target utilization ratio with forecast demand.

Cargo building facility requirements are outlined in **Table 4-28**.

Table 4-28
Cargo Building Area Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Intrastate					
Warehouse (SF)	-	180,000	190,000	200,000	215,000
Support (SF)	-	30,000	30,000	35,000	35,000
Intrastate Subtotal (SF)	310,000	210,000	220,000	235,000	250,000
Surplus/(Deficit)	-	100,000	90,000	75,000	60,000
Other Domestic & International					
Warehouse (SF)	-	920,000	950,000	1,105,000	1,410,000
Support (SF)	-	230,000	235,000	275,000	355,000
Other Domestic & International Subtotal (SF)	900,000	1,150,000	1,185,000	1,380,000	1,765,000
Surplus/(Deficit)	-	(250,000)	(285,000)	(480,000)	(865,000)
Total Building Area					
Total Building Area	1,210,000	1,360,000	1,405,000	1,615,000	2,015,000
Surplus/(Deficit)		(150,000)	(195,000)	(405,000)	(805,000)

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met.

4.7.2 Cargo Apron

The cargo apron serves as an interface for aircraft and support crews to enplane, deplane, and transfer cargo, service and park aircraft, and conduct aircraft turn operations. The facility requirements for the apron are highly dependent on the size of aircraft projected to use the ramp, as well as the operational requirements of the users of the ramp. For this analysis, the cargo apron facility requirements were based on the maximum number and fleet blend of aircraft that are forecast to be on the ground at any one time on the average day of the peak month. This has been determined from the gated design day flight schedule and CAST modeling.

The cargo apron areas are a combination of Airport-owned and tenant-owned spaces. Aircraft that do not process their cargo at ANC facilities typically use Airport-owned spaces and conduct tech stops without processing cargo, departing to their final destination once they are serviced. The Airport-owned parking positions are located in the western portion of the terminal apron, as well as in the North Airpark. These Airport-owned positions are able to accommodate ADG-VI aircraft.

The cargo apron areas on tenant-owned spaces are tailored to specific aircraft types and sizes. For example, FedEx uses a diverse fleet of small feeder aircraft in combination with various widebody aircraft, and each area of the apron is tailored for these specific aircraft. These aircraft fleets are projected to evolve with the increase in the 777F operations and declines of MD-10 and MD-11 operations. The facility requirements analysis accounts for these forecast changes.

The apron area serving cargo airports includes aircraft parking, circulation, and ground support equipment (GSE) storage areas. Future requirements assume that carriers will generally continue to operate in the future as they do today.

Over the course of the planning horizon, cargo apron capacity will need to expand by approximately 45% to meet forecast demand. Existing Airport-owned cargo apron is in particular deficit, which will increase existing instances of long aircraft service queues of non-tenant cargo operators at ANC. The apron area facility requirements are outlined in further detail in **Table 4-29**.

Table 4-29
Cargo Apron Area Requirements

		Existing	Demand			
		Capacity	BASE	PAL 1	PAL 2	PAL 3
Airport Managed Parking	Parking (SY)		200,000	218,000	226,000	226,000
	Circulation (SY)		329,000	358,000	372,000	372,000
	Total	**322,000**	**529,000**	**576,000**	**598,000**	**598,000**
FedEx	Parking (SY)		52,000	64,000	79,000	99,000
	Circulation (SY)		50,000	63,000	73,000	92,000
	Total	**220,000**	**102,000**	**127,000**	**152,000**	**191,000**
UPS	Parking (SY)		125,000	133,000	167,000	203,000
	Circulation (SY)		154,000	161,000	210,000	295,000
	Total	**367,000**	**279,000**	**294,000**	**377,000**	**498,000**
Other Tenants	Parking (SY)		28,000	26,000	29,000	31,000
	Circulation (SY)		58,000	53,000	61,000	64,000
	Total	**143,000**	**86,000**	**79,000**	**90,000**	**95,000**
Subtotal Apron Area (SY)			996,000	1,076,000	1,217,000	1,382,000
GSE Requirement (SY)			100,000	108,000	122,000	138,000
Total Apron Area		**1,052,000**	**1,096,000**	**1,184,000**	**1,339,000**	**1,520,000**
Total Apron Area Surplus/(Deficit) (SY)			(44,000)	(132,000)	(287,000)	(468,000)

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met.

4.7.3 Cargo Landside

Landside facilities are required to support and facilitate the operation of cargo buildings and cargo aprons, providing employee and truck parking, cargo loading, unloading and staging areas, access roads and circulation, landscaping, and other functions. Since the previous Master Plan Update, many landside facilities have been improved to meet the increasing demand of cargo facilities at ANC. A cargo landside planning factor of 30% of the cargo apron requirement, determined using CAST (excluding GSE apron space), was used to determine the cargo landside facility requirements. The planning factor was determined by evaluating current landside usage and factoring in tenant landside constraints.

Facility requirement analysis indicates that landside requirements are being met in current conditions but will be in deficit by PAL 2. The deficiency will be approximately 7%, but by PAL 3 will increase to approximately 33%. The landside facilities are outlined in further detail in **Table 4-30**

Table 4-30
Cargo Landside Area Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Landside Area (SY)	135,000	120,000	125,000	145,000	180,000
Surplus/(Deficit)	-	15,000	10,000	(10,000)	(45,000)

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met.

4.8 General Aviation

General aviation facility requirements were determined for general aviation buildings, apron, and landside areas. General aviation includes all aviation activity outside of those air carriers that operate under Part 121, Part 129, or Part 135 of Chapter 14 of the Code of Federal Regulations. General aviation facility requirements include the based and transient general aviation aircraft operating at ANC. Facility requirements for the Lake Hood Airport are not directly addressed in this document. The general aviation facilities for Lake Hood Airport are discussed in the 2017 Lake Hood Seaplane Base Master Plan Update.

General aviation facilities at ANC are primarily located in the East Airpark and South Airpark. The Airport's general aviation facilities include three fixed-base operators and several other air-taxi and medevac providers. Airfield access between the Airport and the Lake Hood Airport is provided via Taxiway V. A detailed description of the existing general aviation facilities at the Airport is presented in **Chapter 2, Inventory of Existing Conditions**.

4.8.1 General Aviation Buildings

General aviation buildings include aircraft hangars, fixed-base operator terminals, administrative offices, building support space for operations and maintenance, fueling, and ground support equipment storage areas. Building areas for general aviation facilities differ based on the type of activity and aircraft. Requirements were determined for based aircraft facilities and transient aircraft facilities.

4.8.1.1 Based Aircraft Buildings

Building space requirements for based aircraft are greater than for transient aircraft. A greater proportion of based aircraft demand hangar space for long-term storage than do transient aircraft that may be at the Airport only for a short period of time. Hangar areas include aircraft storage, aircraft maintenance equipment storage, general storage, and administrative office.

In determining based aircraft building requirements, it was assumed that all helicopters, all jet aircraft, and half of the multi engine aircraft were stored in conventional hangars. These aircraft types are typically more expensive than single-engine aircraft, so it is reasonable to assume that more protective storage accommodations would be used for these aircraft types. Single-engine piston and the remaining half of the multi engine aircraft are assumed to be stored on the apron using tie-downs.

Planning factors for the aircraft storage hangar area are as follows:

- Multi Engine (Piston and Turbine) 3,200 SF
- Jet 3,700 SF
- Helicopter 2,250 SF

The space planning factors are based on representative aircraft operating at ANC. The single engine aircraft storage space planning factor is based on the Cessna 208 Caravan. The multi engine aircraft storage space planning factor is based on the Beech 200 Super King Air. The jet aircraft storage space planning factor is based on the Learjet 45. The helicopter storage space planning factor is based on the Bell 206. The forecasted number of based aircraft is multiplied by the corresponding planning factor to determine based aircraft storage space requirements.

Support space needed for based aircraft was estimated from the proportion of hangar space dedicated to aircraft storage and support space. A planning factor of 33% of the total hangar space was used to determine support space requirements, while the remaining 67% was allocated for aircraft storage requirements. The based aircraft hangar requirements are anticipated to increase from 312,000 square feet in the Base PAL to 373,000 square feet in PAL 3.

4.8.1.2 Transient Aircraft Buildings

Transient building requirements analysis assumes that transient aircraft are stored in hangars during the winter months to protect the aircraft from harsh weather. Transient aircraft hangar requirements were determined based on transient arrival operations during the average day of the peak winter month. The peak winter month was estimated to be 6.7% of the annual transient operations based on analysis of the ANC general aviation operations from 2019 through 2022. The transient aircraft arrival operations during the average day of the peak winter month are projected to grow from 12 to 15 operations between the base year and PAL 3. It is assumed that most transient aircraft use conventional hangars during the winter.

A planning factor of 5,000 square feet per transient aircraft was used to determine space requirements for transient aircraft. This area includes space for support activities such as maintenance and storage of ground support equipment. This planning factor is higher than the based aircraft planning factors because it accounts for a higher Level of Service for transient aircraft storage. The total transient aircraft building space is anticipated to increase from 32,000 square feet in the Base PAL to 39,000 square feet by PAL 3.

4.8.1.3 Total Buildings Requirements

The based aircraft building area and transient aircraft building area were summed up and are presented as the total building area required. The analysis, as shown in **Table 4-31**, indicates

that in order to accommodate general aviation demand, additional building space is required in PAL 1 and that building requirements will increase through PAL 3. General aviation buildings today comprise approximately 351,000 square feet of building space. By PAL 3, the building requirement will grow to approximately 412,000 square feet, which will require the addition of nearly 61,000 square feet of building space.

Table 4-31
General Aviation Building Requirements

	Existing	Demand			
	Capacity	Base	PAL 1	PAL 2	PAL 3
Based Aircraft Building (SF)	328,000	312,000	330,000	341,000	373,000
Transient Aircraft Building (SF)	23,000	32,000	34,000	35,000	39,000
Total Building Area (SF)	351,000	344,000	364,000	376,000	412,000
Total Building Area Surplus/(Deficit) (SF)		7,000	(13,000)	(25,000)	(61,000)

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met. SF = square feet.

4.8.2 General Aviation Apron Requirements

General aviation apron requirements, described in **Table 4-32**, were determined for based aircraft, transient aircraft, and apron circulation areas. Total based and transient aircraft apron requirements were determined from a top-down approach, meaning that total apron requirements were first calculated, after which the individual requirements for based and transient portions were identified.

4.8.2.1 Based and Transient Apron Area

Total based and transient apron requirements were calculated by applying a utilization rate to the forecasted number of operations. The utilization rate is estimated based on the total existing apron area compared to the Base PAL average day peak month operations. The total existing apron space for all general aviation facilities is 77,000 square yards. Based on the current level of operations during the average day of the peak month, the current utilization rate is calculated to be 500 square yards per operation. Assuming the existing utilization is the desired Level of Service in the future, the current utilization rate was applied to the forecasted average day peak month general aviation aircraft operations to determine the total based and transient apron requirements for the PALs.

The amount of apron space needed for based aircraft was calculated for single-engine and half of the total amount of multi-engine aircraft. This generally aligns with the observations and assumptions that more expensive aircraft are likely to be stored in more protective facilities,

while relatively less expensive aircraft are more likely to be stored on the apron. Planning factors for the aircraft apron area are as follows:

- Single Engine (Piston and Turbine) 2,950 SF
- Multi Engine (Piston and Turbine) 3,200 SF

Forecasts of the number of individual based aircraft by aircraft type were applied to average storage area planning factors to determine the apron requirements for each aircraft type. Apron space to support based aircraft was also calculated, assuming 33% of the total required apron space would be allocated for general support storage and 67% of the total apron space would be used for aircraft storage.

Based and transient apron requirements are described in **Table 4-32**. The apron space required for transient aircraft was calculated by comparing the total apron requirement with the apron requirement for based aircraft. The requirement for transient aircraft increases from 54,000 square yards in the Base PAL to 73,000 square yards in PAL 3.

4.8.2.2 Hangar Circulation Apron

The hangar circulation apron provides an outdoor area for staging and accessing general aviation aircraft stored in hangars and is typically located immediately outside hangar doors. The hangar circulation apron is in addition to taxiways and taxilanes used for general movement on the airfield. Hangar circulation apron requirements were calculated based on observations that approximately 20% of total general aviation hangar area is required for hangar circulation apron space. Apron circulation area requirements are shown in **Table 4-32**.

4.8.2.3 Total Apron Requirements

The total apron area requirement includes the apron area required for based and transient aircraft plus apron circulation space. Analysis indicates that additional apron area is required to meet the Base PAL demand. The requirement for the apron area increases from 85,000 square yards in the Base PAL to 111,000 square yards in PAL 3.

Table 4-32
Total General Aviation Apron Requirement

	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
Based Aircraft Apron (SY)	-	23,000	24,000	25,000	28,000
Transient Aircraft Apron (SY)	-	54,000	56,000	59,000	73,000
Hangar Circulation Apron (SY)	-	8,000	9,000	9,000	10,000
Total Apron Area Required (SY)	77,000	85,000	89,000	93,000	111,000
Total Apron Area Surplus/(Deficit) (SY)	-	(8,000)	(12,000)	(16,000)	(34,000)

Source: RS&H Analysis, 2024.
Notes: Red font color indicates standard not met. SY = square yards

4.8.3 General Aviation Landside

Landside space needed to support general aviation operations includes vehicle parking lots, general landscaping, and undeveloped side-lots that are part of tenant lease lots. In some cases, tenants use their landside area for overflow snow storage in the winter, indicating that landside areas serve multiple purposes.

The existing area allocated for general aviation landside facilities was estimated based on space takeoffs and aerial photography. Current use indicates that landside facilities represent approximately 25% of all leased areas used for general aviation activities.

The general aviation landside and vehicle parking requirements for PAL 1 through PAL 3 were calculated using the same proportion of annual general aviation operational growth through the planning horizon. General aviation landside requirements are described in **Table 4-33**. The analysis indicates that the existing landside area is sufficient to accommodate demand throughout the planning period.

Table 4-33
General Aviation Landside Requirements

	Existing Capacity	Demand			
		Base	PAL 1	PAL 2	PAL 3
Total Landside Area (SY)	39,000	34,000	36,000	37,000	38,000
Total Landside Area Surplus/(Deficit) (SY)	-	5,000	3,000	2,000	1,000

Source: RS&H Analysis, 2024.
Note: Red font color indicates standard not met. SY = Square yards.

4.9 Support Facilities

4.9.1 Aircraft Rescue and Firefighting (ARFF) / Police and Fire

ANC provides its own firefighting and law enforcement services. Aircraft Rescue and Firefighting (ARFF) personnel and law enforcement personnel are by dual-certified officers of the Firefighting and Police force – the men and women of this forcer serve in both roles on a rotating basis. The Firefighting and Police force is headquartered in the ANC Safety Building, also known as Station Number 1, located north of the North Terminal near the North Airpark.

4.9.1.1 ANC Safety Building (Station Number 1)

Station Number 1, or more commonly referred to as the ANC Safety Building, is approximately 30 years old and is in need of renovation to repair and upgrade essential building systems and provide modern law enforcement and investigative infrastructure. A building evaluation was completed in 2024 as part of a separate project outside of the Master Plan Update that identified several mechanical, electrical, and plumbing systems that are past the useful life. ANC is evaluating options to renovate the Safety Building to resolve these issues and extend the useful life of the building.

ANC is classified as Index E for ARFF operations. This is determined by the type and number of aircraft in operation at ANC, and the length of the largest air carrier aircraft with an average of at least five daily departures. ANC is expected to remain at Index E through the planning period since the Boeing 747-8F is forecast to be the critical aircraft throughout the planning period.

The Safety Building has sufficient space to accommodate the ARFF function based on review of the existing building spaces and ARFF design guidelines described in FAA Advisory Circular 150/5210-15A, *Aircraft Rescue and Firefighting Station Building Design*. The Safety Building generally has enough space to accommodate the ARFF function. This includes ARFF apparatus bays, ARFF gear storage, and crew quarters. This assessment is confirmed through discussion with the Fire and Police Chief.

The Safety Building is undersized for modern law enforcement requirements. Additional building space is required to support modern interrogation rooms, holding cells, evidence record storage/archives, enhanced information technology infrastructure, and general administrative space to support law enforcement.

The ANC incident response and dispatch function is currently accommodated in administrative space within the North Terminal Building. However, ANC has determined that this function should be collocated with firefighting and law enforcement personnel. There is an ongoing project as of Summer 2024 to upgrade the necessary support facilities (e.g., enhanced

information technology infrastructure) and renovate the top floor of the Safety Building to accommodate the relocated incident response and dispatch function.

Expansion of the Safety Building in-place and/or relocation of the ARFF and law enforcement functions is evaluated in the alternatives analysis. The inadequate sizing and facilities for the law enforcement function creates strain on all building users, including the firefighting function. Development options to resolve the Safety Building space needs were evaluated in the airport development alternatives phase of this Master Plan Update. Those development alternatives are described in **Chapter 5 Airport Alternatives.**

4.9.1.2 Station Number 2

The apparatus bays in Station Number 2 (located in the northwest portion of the former Kulis Air National Guard Base) lack the length to accommodate the larger ARFF vehicles within the ANC fleet. Additionally, the building infrastructure is aging, and critical building components are in disrepair. For example, the HVAC system of the building has difficulty maintaining a constant temperature throughout the building due to age. Renovation of Station Number 2 is not recommended despite the building condition issues.

4.9.1.3 Minimum Response Times

ANC ARFF minimum response times comply with mandated Part 139 vehicle response times throughout the airfield. Part 139 requires the first ARFF vehicle to reach the midpoint of the farthest runway within three minutes and additional vehicles to reach the midpoint of the farthest runway in four minutes The ARFF response vehicles are housed and deployed from the Safety Building / Station Number 1. The Safety Building location ensures the required response times can be met. Minimum response time is expected to continue to be met throughout the planning period from the current Safety Building location and with the existing airfield layout.

4.9.1.4 ARFF Vehicles

Index E airports are required to provide three vehicles for ARFF operations - one carrying extinguishing agents and two carrying the amount of water and appropriate aircraft fire fighting foam (AFFF). The total quantity of water for form production carried by all three vehicles is required to be at least 6,000 gallons. The existing ANC ARFF vehicle fleet satisfies this requirement. ANC acquires new ARFF vehicles as needed to replace aging vehicles.

4.9.1.5 Training Facilities

The ARFF Training Facility and the Police Training Facility are collocated south of Runway 7R-25L, west of the developed portion of the South Airpark. Both facilities are planned for demolition to enable the extension of Taxiway Z.

ARFF personnel perform firefighting training and recertification at an offsite location. A replacement on-Airport ARFF Training Facility is not recommended. Transitioning to offsite police training creates challenges for personnel to receive adequate firearms training. A replacement on-Airport Police Training Facility is recommended. Options to accommodate a new on-Airport Police Training Facility are described in **Chapter 5 Airport Alternatives**.

4.9.2 Fuel Storage

AFSC / Menzies currently has sufficient capacity to accommodate current fuel service demand. AFSC / Menzies is currently exploring alternatives for expansion and has commissioned an external study to determine the future fuel storage needs at ANC. Preliminarily, AFSC has determined that additional fuel tanks at ANC will be required in the future to meet forecasted demand; however, specific details such as tank number and size have not been determined. The construction of additional fuel storage facilities at the Port of Anchorage is not being pursued due to cost and construction constraints, making ANC the preferred area of development. Expansion would likely occupy the area to the north of the current site and would double the land that the fuel farm occupies.

4.9.3 Airport Maintenance

Airport maintenance is responsible for the day-to-day maintenance of airport facilities such as pavement and pavement marking maintenance, landscaping of unpaved areas, and maintaining the efficient operations during winter weather events. Facility Requirements were calculated for snow storage and disposal areas.

Airport maintenance requirements are not directly associated with aircraft operations, rather they are associated with the size of the areas that must be maintained. This means that the factor that determines airport maintenance facility requirements is the increase in facility size, such as an additional runway, taxiway, and apron development.

Snow storage facilities are dependent on the annual amount of snowfall and the total area of pavement being cleared. Anchorage maintains an average daytime temperature below freezing during much of the winter weather season. Snowfall is commonly expected between October through April and limited snowmelt days compound the snow storage requirements. Much of the snow at ANC is plowed and moved to temporary snow during active winter events. The snow is transferred to snow disposal sites following the winter event.

Temporary storage sites are typically located close to pavement areas and provide a convenient location to dump snow during snow events. Temporary storage sites tend to be smaller and with several locations around the Airport. Snow disposal sites are used for long-term snow storage. Snow in the disposal sites will remain in those locations until it melts in warmer months. Snow

disposal sites are larger with fewer locations around the Airport. The stored snow must also be separated between snow contaminated with deicing material and snow with no such contamination, typically meaning snow originating from the AOA will stay within the AOA.

Snow storage facility requirements are calculated by determining the ratio of the area of existing snow storage areas compared to the area of pavement required to be cleared. Snow storage facility requirements assume future weather patterns will generally resemble current conditions. Snow storage requirements will increase as airport pavement area increases, so no requirements for PALs are established in this chapter. Each area is separated by use type. The existing snow storage and disposal areas are summarized in **Table 4-34**. The existing pavement areas is summarized in **Table 4-35**.

The planning factor to calculate the required future snow storage and disposal sites is based on the existing ratio of Assuming airside snow remains within the AOA, then the planning ratio for snow is approximately 0.07, where the landside ratio is 0.25. If landside and airside were to share snow storage sites, the ratio would be 0.10. If storage sites were to be shared, then contaminated snow must be treated before storage or the storage areas must have proper contamination collection systems such as a closed drain system to prevent further contamination.

Table 4-34
Snow Storage Areas

Airport Areas	Landside	Airside	Total
Temporary Snow Storage Sites	215,000	236,000	451,000
Snow Disposal Site Maintained by Field Maintenance	780,000	916,000	1,695,000
Snow Disposal Site Maintained by Lease Tenants	80,000	446,715	527,000

Source: Alaska Department of Transportation and Public Facilities, *2021 Snow and Ice Control Plan.*

The requirements cannot fully be determined at this point because the need for additional storage and disposal areas depends on the plan for additional pavement areas. The plan for additional pavement areas is established through the alternatives development phase of the Master Plan Update. Thus, the requirement for additional storage and disposal sites will be determined when the future pavement area is determined.

Table 4-35
Existing Pavement Areas Applicable to Snow Removal Operations

Airport Area	Pavement Areas [1]
Runways (SF)	6,410,000
Taxiways (SF)	8,735,000
General Aviation (SF)	1,509,000
Landside (SF)	3,928,000
Apron (SF)	5,575,000
Total (SF)	26,157,000

Source: RS&H Analysis, 2024
Note: 1 – Pavement areas include Lake Hood Airport

Potential locations for new storage and disposal sites are described in Chapter 5 Airport Alternatives. Considerations for appropriate sites include spacing across all areas of the airport environment so vehicles moving snow do not spend excess time transiting between the snow removal operations area and the snow storage area.

4.9.4 Utilities

ANC relies on surrounding organizations to provide their utility services. Power is supplied by the Chugach Electric Association, natural gas is provided by Enstar Natural Gas Company, water sanitation is provided by the Anchorage Water and Wastewater Utility (AWWU) and is serviced at the Asplund Wastewater Treatment Facility, and communications services are provided by Alaska Communications Systems.

Current facility requirements are being met by these utility service providers. AWWU has recently been connected to facilities in the South Airpark, providing them with water and sewer services. As demand grows for each utility service, proper coordination and planning with each provider is necessary to ensure proper service without restriction or undue interruption. Of these utilities, the utility with the highest forecasted need is electric power, due to forecasted electric vehicle charging station demand on the power grid. Charging of electric vehicles is power intensive and will require diligent planning and implementation from ANC and the Chugach Electric Association. These entities, ANC, tenants, and surrounding landowners will need to continuously coordinate efforts in accessing and preserving land for utility installation and maintenance.

4.9.5 United States Postal Services Facility

The United States Postal Services (USPS) facility is located in the North Airpark, southeast of the Postmark Drive and Lake Hood Drive intersection. The USPS facility is the primary postal facility for the state of Alaska. The USPS is undergoing phased implementation of the "Delivering for America" plan. The plan restructures the USPS network nationwide. Indications are that the USPS

Delivering for America plan may require expansion of the ANC USPS facility in the 10-year timeframe; however, this remains in flux as of summer 2024. The anticipation is that the plan would make the ANC USPS facility take on a larger role as a Regional Distribution Facility/Hub. The estimated additional space needs ranges from one to five acres. The additional space would be used to accommodate a building expansion and additional lot space for truck trailer storage. Options for accommodating the USPS expansion are described in **Chapter 5 Airport Alternatives**.

4.9.6 Electric Vehicle Support Infrastructure

Vehicle electrification trends and its role in airport parking and Consolidated Rent-a-Car (ConRAC) operations was evaluated as part of this Master Plan Update. This section summarizes the electric vehicle (EV) growth trends and requirements for electric vehicle support equipment (EVSE) at ANC to accommodate the potential growth. A more detailed description can be found in **Appendix E – Electric Vehicle Infrastructure Forecast for Parking and ConRAC Operations**.

EVs can be charged using EVSE operating at different charging speeds.

Level 1 (L1) charging equipment provides charging through a common residential 120-volt (120V) AC outlet. L1 chargers can take 40-50+ hours to charge a battery electric vehicle (BEV) to 80 percent from empty and 5-6 hours for a plug-in hybrid electric vehicle (PHEV), according to the U.S. Department of Transportation.

Level 2 (L2) charging equipment offers higher-rate AC charging through 240V (in residential applications) or 208V (in commercial applications) electrical service, and is common for home, workplace, and public charging. Level 2 chargers can charge a BEV to 80 percent from empty in 4-10 hours and a PHEV in 1-2 hours, according to the U.S. Department of Transportation.

Direct current fast charging (DCFC) equipment offers rapid charging along heavy-traffic corridors at installed stations. DCFC equipment can charge a BEV to 80 percent in just 20 minutes to 1 hour, according to the U.S. Department of Transportation. Most PHEVs currently on the market do not work with fast chargers.

Level 2 and DCFC equipment are commonly deployed at public locations. Resulting vehicle dwell times, estimated up-front, and ongoing costs are important considerations when selecting EVSE for installation. Chugach Electric was interviewed to understand its preparations for EVs and its support for infrastructure expansion at the airport. Providing EV charging infrastructure for the traveling public and RACs will require electrical service upgrades. Close collaboration on

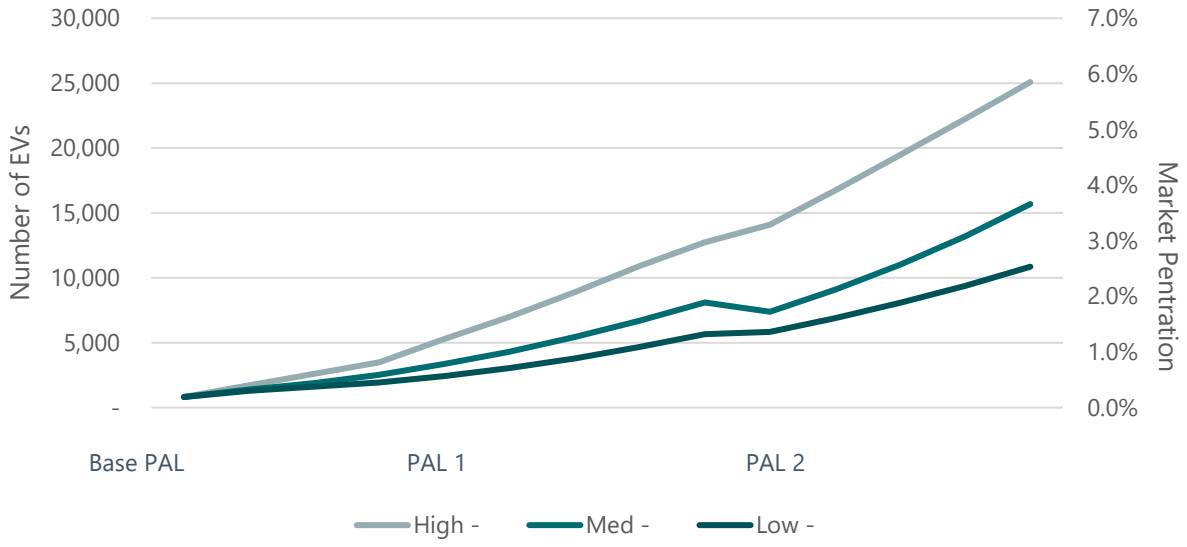
strategic electric service upgrades as well as efficient operations will be required to maximize cost-effectiveness.

4.9.6.1 EVSE Requirements for Parking Facilities

An EV forecast analysis was completed by extrapolating the current pace of EV adoption nationally and within the Anchorage Metropolitan Statistical Area (MSA) to project future growth. The forecast EV adoption in the Anchorage MSA is described as three growth scenarios (i.e., Low Growth, Medium Growth, and High Growth) to account for variability and unpredictability of consumer sentiment towards EVs. The EVSE forecast analysis only extends through 2035 calendar year due to data availability. Therefore, data for PAL 3 is not available for the EVSE requirements.

There were 804 EVs registered in the Anchorage MSA as of May 2023. This represents 43% of the Alaska's EVs. The analysis results show that EVs are projected to make up 3% to 6% of all vehicles in the Anchorage MSA by PAL 3**.** Local growth is slower than national trends but still projected to grow from a few thousand in the Base PAL to tens of thousands by PAL 3, as depicted in **Figure 4-27**.

Figure 4-27
Vehicle Counts and Market Penetration for Anchorage MSA



Source: U.S. Energy Information Administration, 2023; RS&H Analysis, 2024
Note: EVSE forecast analysis only extends through 2035 calendar year due to data availability. Therefore, data for PAL 3 is not available for the EVSE requirements.

The facility requirements for EV charging infrastructure at the public parking facilities were determined based on forecasted penetration of EVs in the Anchorage MSA and public parking

occupancy patterns at ANC. The analysis results for the Medium Growth Scenario show that 16 charging points are required in the ANC parking facilities in PAL 1 and 32 charging ports are required in PAL 2. The forecasted EV charger requirements are described in **Table 4-36**.

Table 4-36
Forecasted EV Chargers by Facility for Medium Growth Scenario

	PAL 1				PAL 2			
	Short Term	Long Term	Park, Ride, and Fly	Total	Short Term	Long Term	Park, Ride, and Fly	Total
DCFC	1	0	0	1	3	0	0	3
L2	2	1	0	3	6	3	0	9
L1	1	5	6	12	3	11	6	20
Total	**4**	**6**	**6**	**16**	**12**	**14**	**6**	**32**

Source: RS&H Analysis, 2024.
Note: EVSE forecast analysis only extends through 2035 calendar year due to data availability. Therefore, data for PAL 3 is not available for the EVSE requirements.

L1 chargers are recommended for Long Term parking stays given the vehicle dwell time and relative lower cost of L1 chargers. L2 chargers are recommended for the Short Term lot since typical parking duration is for a day or less. DCFC could also be used in the Short Term lot, but the L2 chargers are recommended. The employee lot could have a mixture of L1 chargers and L2 chargers, but L2 chargers are recommended since most employee vehicles dwell for a day.

Potential energy consumption for the three growth scenarios are described in **Table 4-37**. The power demand of EV charging ports is measured in Kilowatt-hours (kWh) or Megawatt-hours (MWh) ("demand"). ANC currently uses approximately 3.6 MW annually. The 0.45 MW forecasted in the PAL 2 High Growth Scenario is a 12.5% increase in ANC's current power demand. For reference, 0.45 MW is equivalent to the electric demand of 840 single-family homes in a month.

Table 4-37
Forecast Energy Use and Power Demand

	PAL 1	PAL 2
Low Growth Scenario		
Energy Use (MWh)	62	164
Power Demand (MW)	0.08	0.17
Medium Growth Scenario		
Energy Use (MWh)	93	227
Power Demand (MW)	0.09	0.25
High Growth Scenario		
Energy Use (MWh)	164	421
Power Demand (MW)	0.17	0.45

Source: RS&H Analysis, 2024.

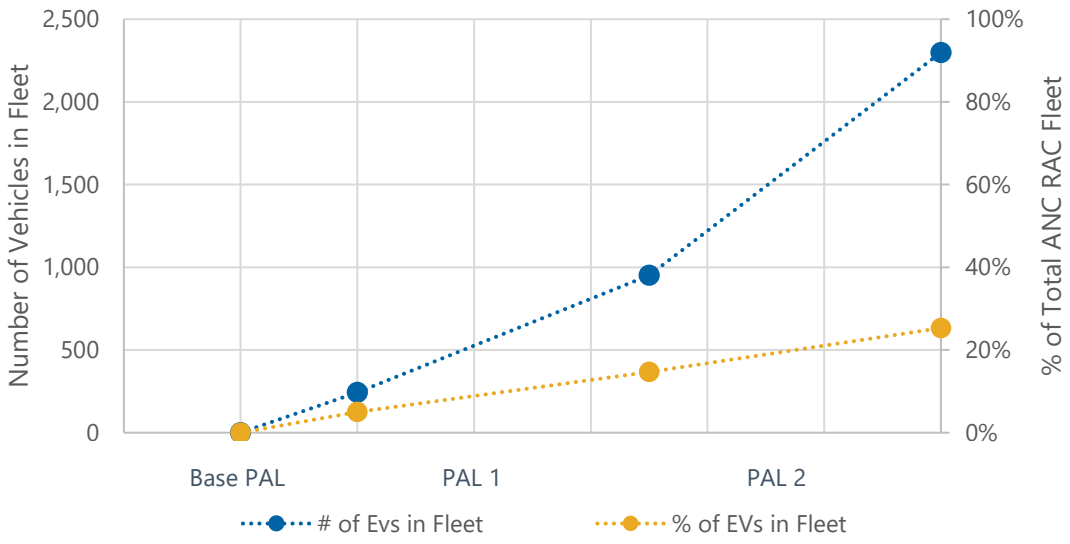
Note: EVSE forecast analysis only extends through 2035 calendar year due to data availability. Therefore, data for PAL 3 is not available for the EVSE requirements.

4.9.6.2 EVSE Requirements for RAC Facilities

Peer airports and Rent-A-Car (RAC) companies at ANC were interviewed to characterize the EV demand and associated EVSE requirements for the RAC operation. The peer airports were selected for commonalities with ANC (e.g., size, origin and destination travel volume, market, etc.). The three peer airports are Seattle-Tacoma International Airport (SEA), John Glenn Columbus International Airport (CMH), and Indianapolis International Airport (IND).

The peer airports reported installing a variety of EV charging infrastructure across their parking offerings and working closely with RACs to facilitate EVs in their operations. RACs are taking various approaches but they share an aggressive EV deployment outlook. More than 20% of the total RAC fleet at ANC could be EVs within the planning period, as depicted in **Figure 4-28**.

Figure 4-28
Present and Forecasted RAC EV Fleet & Precent of RAC EV Fleet at ANC



Source: RS&H Analysis, 2024.
Note: EVSE forecast analysis only extends through 2035 calendar year due to data availability. Therefore, data for PAL 3 is not available for the EVSE requirements.

The analysis results show that upgrades to the Airport's electric infrastructure and potential upgrades to the ANC electrical infrastructure will be needed. This would allow for quicker turn times to get vehicles charged. Power demand and energy use in ANC's ConRAC operations is projected to reach 2.0 MW between PAL 2 and PAL 3, which is greater than a 50% increase over ANC's current use of approximately 3.6 MW.

4.9.6.3 Fire Protection Considerations

National Fire Protection Association (NFPA) sets codes and standards for fire, electrical, and related hazards. The NFPA has determined that EV fires are less common and not inherently more dangerous than Internal Combustion Engine (ICE) vehicle fires. However, the techniques for responding to them are different. The NFPA has updated its codes to increase requirements for fire protection in parking garages considering the growth of EVs. The effect is to require a greater density of sprinkler system coverage. These requirements, as well as additional safety considerations, should be explicitly addressed as part of ANC's design requirements.